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CITY PLANNING DIVISION
Proceedings of the American Society of Civil Engineers

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Journal of the
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URBAN EXPRESSWAYS: JOINT PLANNING OF TRANSPORTATION AND LAND USE[a]

Roger L. Creighton[1]

FOREWORD

In Proc. Paper 2048, Roger L. Creighton postulates that the movement of persons and vehicles on transportation systems and the activities of persons on land are both parts of human activity in cities. Consequently, planning for one means planning for the other. He then describes the procedure for joint planning of transportation and land use.

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In Proc. Paper 2050, Fred W. Tuemmler proposes that highway and planning agencies: 1. Establish formally joint policy of continuous collaboration, settle disagreements at staff levels - not in the local press; 2. Accelerate urban planning programs in fringe areas to meet highway planning deadlines; and 3. Invoke acquisition of development rights in interchange and approach road areas as supplemental land use controls.

SUMMARY

The movement of persons and vehicles on transportation systems and the activities of persons on land are both parts of human activity in cities. Planning for one is planning for the other, therefore joint planning is essential, and a procedure for the joint planning of transportation and land use is described.

Note: Discussion open until November 1, 1959. Separate discussions should be submitted for the individual papers in this symposium. To extend the closing date one month, a written request must be filed with the Executive Secretary, ASCE. Paper 2048 is part of the copyrighted Journal of the City Planning Division, Proceedings of the American Society of Civil Engineers, Vol. 85, No. CP 1, June, 1959.

a. Presented at the October 1958 ASCE Convention in New York, N.Y.

1. Asst. Director, Chicago Area Transportation Study, Chicago, Ill.

In 1958 the American Institute of Planners established a committee to consider the questions raised by highway and transportation planning. The committee, after much work and deliberation, proposed a statement of policy for the Institute. The following are the major points of this statement.

1. Highway and transportation planning is a term which includes a number of specialized types of planning operations. These types of planning should not be undertaken separately from land use planning or from other types of planning which affect urban areas.

2. No single professional group can get along without the assistance of other professionals when undertaking work which is as interrelated as community development and transportation. Therefore, procedures for collaborative work, especially at the local level, should be established.

3. Tremendous road building programs will be undertaken in the next two decades. To secure the greatest advantage from these programs and to permit city planning to make its maximum contribution toward this end, it is necessary to accelerate the development of comprehensive plans for urban areas, particularly the land use portion of the comprehensive plan.

4. Lack of knowledge about the influence of the different forms of transportation and the reciprocal effects of community development on transportation needs, makes the accurate evaluation of proposed improvements very difficult. Therefore, the Institute should encourage research in transportation planning, particularly in developing relationships between land use and transportation services.

The conclusions which were reached by the committee all revolve around the thought that transportation planning and land use planning are inseparable.

This last statement sounds like a platitude. It is and will continue to be a platitude until there is more understanding of the reason why land use and transportation are inseparable and in particular how they can be planned together.

Transportation and land use are abstract terms. Although abstractions are wonderful for shorthand thinking, the difficulty is that people forget often to re-think them in terms of the concrete realities which they represent.

Transportation is converted easily to concrete terms. People think of transportation in terms of facilities, such as highways, streets, and rails, and in terms of movement, such as moving vehicles or moving persons.

Land use is perhaps more difficult to convert into concrete ideas. It has been used too long as an abstraction. Land use can be visualized as buildings and structures, and the static (or semi-static, since most activity requires some motion) activities which occur in and around those buildings and structures.

In both cases (transportation and land use) it is the dominant activity or movement which the facilities, buildings, or structures are intended to serve. To escape from reverting to the abstract again, let the reader continue to think of the dominant item in transportation as vehicles and persons in motion, and the dominant item in land use as activity, which is persons and machines doing things.

Activities require space. Any encroachment upon the space needed by an activity jeopardizes the performance of that activity. For example, a steel

mill is an activity. No one would dream of running a road through the middle of that activity because it would totally disrupt it.

A residential neighborhood is also a collection of activities: keeping house, educating children, shopping, neighboring, going to church, and so forth. Also included are minor movements of vehicles and persons necessary to maintain this web of social interaction. A residential neighborhood, although a less noisy and dynamic activity than the steel mill, also requires space, an efficient shape and internal layout, and no infringement by other activities.

In such terms, land use ceases to be an abstract, nebulous concept, and becomes a series of actions taking place at certain locations, requiring space, and associated with other activities.

Activities generate traffic - they require people and vehicles and goods to come to them in order that they may function. In fact, the movement which is generated by these activities is merely an extension of their actions, or an inter-connection with other activities.

Examined in this light, transportation and land use are inseparable, because they are part of the same thing. They are both parts of human activity in urban areas. (Note also that transportation facilities require land, in the amount of one-third or more of total developed urban area.) Planning for one is planning for the other so that by inference separate planning is impossible.

Given this conclusion, how are the two to be planned together?

The first requirement is the availability of factual evidence on land use, travel, and the relationship between the two. With such data there is always a sense of realism and control, and the possibility of testing results to see if they are in scale.

A forecast of the distribution of land uses throughout the planning area, by type and by intensity, is the next step. This forecast is a combination of steps, some of which can be done by formula and machine, some of which require hand methods. The allocation of lands for housing, for streets, for public buildings and small public open space, and for some commercial uses can be done mechanically. The allocation of land for industry, large public open spaces, large transportation facilities, cemeteries, and any other unusual, unevenly distributed activities must be done by hand. The establishment of densities of residential and industrial uses can be done based on spatial and historical evidence. With controls on totals for the planning area and for each small sub-area, it is impossible for this forecast to get wildly out of balance.

The results of the land use forecast are a series of maps and tabulations giving the uses of land in small areas throughout the planning area. In the case of industry, large public open spaces, and transportation facilities, the forecast is 'formed,' that is, the areas are precisely located on maps. For the rest (residential, public buildings, small public open spaces, streets, small commercial areas) there are just figures and densities - an amorphous spread of activities fairly evenly distributed throughout the planning area. The next task is to give this shape and form.

Consider that joint planning is undertaken at two levels: the metropolitan level and the local level. At the local level attention is focussed on the activities and travel movements of groups of 30,000 - 100,000 people. At the metropolitan level there is an additional concern for long distance travel and for the specialization of activities within the metropolitan area.

At the local level, residential communities are the primary concern. They occupy 60-80 per cent of the developed land when their auxiliary activities

(churches, schools, streets, and playgrounds) are included. Moreover, this is the grouping of activities which must be shaped.

In these residential communities, a balance must be struck between medium and long distance movement (travel) and the activities of the community. Not all needs can be satisfied in the local area - in fact, this would be the antithesis of metropolitanism. Therefore, a proportion of these trips must move away from the local area. This proportion is a regular function of distance - approximately 65 per cent of all trips are more than two miles in length, and must leave a local area if that area is of medium size - say two miles by two miles. Hence their destinations are in other areas. To be efficient, these longer movements must be grouped on transportation facilities of higher capacity and higher speed. Such facilities occupy so much land and are so detrimental to residential areas that they naturally form boundaries to residential communities. Hence the idea of a building block is brought into being.

The proper size of the residential building block is a function of the activities within it. Government, schools, police, fire protection, a sense of 'belonging' - these things function best for areas of certain sizes. Studies indicate 30,000 - 100,000 population are proper lower and upper limits. But travel considerations also impose limits. If the building block is too large, (e.g. five miles by five miles) too much of the length of the average journey (4.5 miles) is driven on local streets, and the long-distance system is not efficiently used. A closer spacing of expressways and freeways greatly increases the amount of travel on these facilities - and hence the service to the typical driver. It also increases total costs. The determination of the proper size of this building block is one of the most important joint land use and transportation planning decisions.

Once the size of the building block has been fixed, and hence the spacing of major roads, sketches must be prepared. These are undertaken with the aid of a map with a series of overlays showing the 'barriers' effecting layout. These 'barriers' include cemeteries, railroad yards, industrial areas, public parks and major open spaces, railroad lines, expressways and toll roads, and similar elements influencing the location of routes and the sizes of residential communities.

Sketching at the metropolitan level, transportation facilities are planned to divide the area into building blocks, to serve major metropolitan activities (i.e. the CBD, industrial concentrations, major shopping centers, airports, residential areas), and to serve traffic.

The last step is to convert the metropolitan sketches back to the local level, and to consider the practicalities of detailed route location. These may naturally affect the large scheme, and the result will be a series of studies back and forth from the metropolitan to the local level, until a desirable plan or plans have been prepared. Always, service to moving vehicles must be balanced with service to the semi-static activities taking place on land.

By taking a view that land use is a set of activities which generate traffic and which also requires certain spaces in which to function, many old principles must be re-examined.

One example is the commercial strip development. This has been held to be a bad thing, both by city planners and by transportation planners. Yet, land use data shows that more land is needed for commercial development than had been hitherto thought. Much of this land is needed for activities which cannot

function well in the typical super-market or department store shopping centers. Accessibility is required for these commercial activities. It seems that the strip development may be the only answer. Then why not try to design future arterials and expressways and their abutting properties in such a fashion that the two things can get along together?

Another example is the view that each residential neighborhood or community should be a microcosm of the city - surrounded by parks, with a commercial core. But the functions of the community are disrupted by traffic. The commercial core always tries to expand, increasing traffic. The layout of residential functions and traffic is not reconcilable easily. Why not, then, turn the community inside out, with commercial areas on surrounding, medium-speed expressways, and the parks in the center? This is a layout which much more truly expresses the functional requirements of all the activities.

In summary, the whole idea of joint land use and transportation planning revolves around the principle that the two things are inseparable. They are inseparable because they are both part of the same thing: human activities in an urban setting, requiring space and generating travel between activities. The measured relationships between the two items provides a bridge which connects them together. Engineers will appreciate the work of city planners more as the planners demonstrate that there is a strong factual basis behind their work, and that activities require spaces of certain sizes, shapes, and other characteristics in order to function properly. Planners will appreciate the work of engineers more when they realize that traffic is an extension of activities taking place on land. Together, the two groups ought to be able to design cities in more functional and hence better ways.

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URBAN EXPRESSWAYS: THE HIGHWAY ENGINEER AND CITY PLANNER[a]

John S. Tsaguris,[1] A.M. ASCE

FOREWORD

In Proc. Paper 2048, Roger L. Creighton postulates that the movement of persons and vehicles on transportation systems and the activities of persons on land are both parts of human activity in cities. Consequently, planning for one means planning for the other. He then describes the procedure for joint planning of transportation and land use.

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SUMMARY

This paper emphasizes the need for closer cooperation between Highway Engineers and City Planners regarding the general character, extent and location of highway facilities through or near urban areas. Expert correlation of highway and city plans is an absolute requirement if highways are to serve the future as well as the present.

Note: Discussion open until November 1, 1959. Separate discussions should be submitted for the individual papers in this symposium. To extend the closing date one month, a written request must be filed with the Executive Secretary, ASCE. Paper 2049 is part of the copyrighted Journal of the City Planning Division, Proceedings of the American Society of Civil Engineers, Vol. 85, No. CP 1, June, 1959.

a. Presented at the October 1958 ASCE Convention in New York, N. Y.

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INTRODUCTION

A great deal has been written about the multi-billion dollar interstate highway program, and it is felt that little can be added with one exception— the relationship of the Highway Engineer and the City Planner in the evolution of this system. Some thoughts are due on the role that the City Planner should play in the location and design of these highways, some first hand examples, and, it is hoped, some constructive suggestions.

It must be acknowledged that the highway engineers have a monumental task at hand, not only from the standpoint of magnitude, but time limitations as well. They will undoubtedly execute their work in the finest traditions of the Civil Engineer. But one criticism is offered, and it is hoped that it will be considered a constructive one, and that is the apparent apathy that the highway engineer has accorded the city planner. The city planner, on the whole, has undoubtedly been responsible to some extent, and the highway engineer has been a little confused by this variably trained professional who calls himself a city planner.

Although city planning is a young profession with several separate and distinct professions contributing to a greater or lesser degree, the civil engineer has contributed in the past the greatest measure to the passing of city planning through the arts and into the sciences. It is hoped that he will continue to do so and merit recognition as one of the primary basic disciplines.

It is simple to understand how, but it is quite difficult to understand why, members of the profession of civil engineering, which indeed founded the first technical division of the American Society of Civil Engineers as the City Planning Division, can so constantly overlook the city planner as an essential member of the team that is required to conceive and design these highways. It is probable that some states recognize the knowledge and services of the city planner and include him as an integral part of their organization or at least understand the services he can and should render. These states are probably in the minority. The state highway engineers and the city planners in the state of Arizona enjoy a rather good relationship; however, there is a wide area of opportunity for improvement. For instance, the prevailing attitude has been to listen to the city planner regarding some urban development objective related to the highway program if and when the city planner takes the initiative and injects himself into the question, but there has been little initiative on the part of the highway engineers to correlate in advance highway location, geometric details, and other features with local master plans that have been years in existence and evolution.

Tucson, for example, is fortunate that most of the interstate highway system in its vicinity has been already located and rights-of-way acquired, and is now under advanced stages of construction. This progress is due very largely to the fact that the location of this highway was anticipated and incorporated by engineer-city planner Segoe as a part of the Tucson Regional Plan as early as 1941. The five miles of rights-of-way within the Urban Area acquired late in the 1940's conform to present interstate highway standards. The only adjustment necessary since then has been only in details of geometric design.

As a matter of background information, some mention should be made of some of the characteristics of the Tucson Area. Its economic and population growth recently has been quite rapid. It has been rated frequently by Rand

McNally as among the top ten fastest growing business centers in the nation. Before 1940, Tucson grew at a rather normal and steady rate. In 1930, the population of the urban area was 42,971, and in 1940, the area had grown to 58,072. Between 1940 and 1950, the population more than doubled, attaining 123,764 according to the 1950 census. During the past eight years, the net migration and normal growth due to births has been at the rate of about 1200 persons per month. Present population is estimated at 240,000. According to population projections, it is conservatively estimated that there will be over 500,000 persons residing within Tucson and its environs by 1975. Tucson is on the southernmost East-West U.S. Highway and on the North-South Pan American, Canada to Mexico Highway. In accord with Federal requirements, the Arizona Highway Commission held its first public hearing on the Interstate Highway System in Tucson on December 6, 1956.

Regarding land use adjacent to the Interstate Highway in the Tucson Urban Area, the use most predominately thus far proposed has been that of industrial. On the surface, this might appear reasonable in that the highway today carries goods as well as people. Transportation-wise, the highway is considered just as suitable as rail and even more convenient in some instances. But appropriate land use is dependent on many conditions other than transportation. For instance, the mere fact that there is a first rate highway facility adjacent to good residential neighborhoods certainly does not mean that these should be redeveloped industrially, and as a corollary, it does not even mean that an undeveloped area whose best potential lies in residential development should be zoned industrially just because it lies along a railroad or major highway. This situation should not be approached blindly considering only the single factor of highway convenience. The many additional factors that govern the highest and best use of the land should be considered as well.

The Tucson master plan finds no quarrel with the general locations of these highways as existing or proposed by the Arizona Highway Department, since the locations have evolved along with it. Future land use plans either dove-tail with these locations or will, with reasonable adjustments. The largest single revision that will be necessary affects about four square miles of land to the south of the city that had previously been planned for single-family residential neighborhood units, and it may be shown by studies under way that adjustment to industrial and other uses will be necessary. But due to other factors, these revisions will not adversely affect the growth and development of the city. It is found that principal points of conflict occur in geometric details of highway plans, particularly those involving grade separations and traffic interchanges.

A very real example bringing the matter of poor and insufficient information correlation into focus occurred on Tucson's Congress Street - Controlled Access Highway Interchange. Congress Street is one of the main east-west streets bisecting the central business district. Its intersection with the north-south interstate highway is located only three short blocks west of City Hall and less than one half mile west of the heart of the business district. During the month of April, in 1957, officials of the City of Tucson learned that a diamond interchange was being designed for this intersection. Locally, planning and public works officials were all aware of the fact that existing left turn movements were heavy, and according to projections, would become worse in the future. Without studying, and it is hoped that not in disregard of, these facts, the Highway Department, acting through consulting engineers,

had already completed structural design.

Since left turn movements were found to be not only exceedingly heavy at the present but calculated to be worse in the future, it was obvious that the design permitting only two lanes of through traffic for the critical periods of peak traffic demands was inadequate, to say the least. In other words, rather than designing a traffic interchange that would handle traffic up to at least 1975, the design was already inadequate for existing traffic loads. The minute the Highway Department was notified of this, all design work was stopped and traffic surveys and projections commenced. Practical capacities, according to methods outlined in the "Practical Capacity Manual" of the Bureau of Public Roads were made by the Tucson City-County Planning Department, and several meetings were held between the representatives of the Bureau, the Arizona Highway Department, Tucson's Director of Public Works, the City Planning Department, and the consulting engineers. Following about a month's work on this, it was agreed to revise the plans for a greater span permitting not only four through traffic lanes but two left-turn lanes and the introduction of a new relief street and grade separation. These revisions, of course, meant loss of time and money but were negligible in cost compared to the traffic delays and inconvenience that would have occurred in the future.

This case serves as an example of what not to do in the future. Tearing the situation down to its fundamental elements, what happened was that structural design had been completed without regard for existing as well as anticipated traffic conditions which the local planning agency should have been called on by the State Highway Department to provide. The cart was put before the horse, probably because the stampede was on. Since this incident, however, it has been found that the highway engineers consult more readily with local authorities regarding details of this type.

Local and state planners and engineers are now working jointly on the location for the penetration route. At this stage, there are still some differences of opinion, but all of these are being approached in a proper manner, and it is felt that the final location and resultant design will be correlated reasonably with the community's master plan and in accord with good highway planning standards. If the master plan is in need of revision in view of other important conditions, it will be changed accordingly and by due process.

Another interesting case was the location of the interstate highway through Casa Grande some 67 miles northwest of Tucson. At the time the planners entered the problem, the State Highway Department had proposed that the interstate route bisect the city in an alignment running from southeast to northwest. This alignment lay in the path of the preferred direction of growth and would have cut the city in two as by a "Chinese Wall." These interstate highways, of course, are formidable barriers when considering intercommunication within a city. It is hoped that some experience has been gained in analyzing the effects of rail location on community development.

Casa Grande, through its city manager, mayor, council, and other interested citizens was up in arms. There was complete division regarding location desires, and a young civil war had begun. Following concentrated city planning study, it was recommended that the route be located to the south, away from the desired direction of growth, and then turned northerly, west of the city. While this location might mean some additional travel distance for a part of the traffic, nevertheless, the benefits accrued from a community development standpoint outweighed the uncertain benefits of a direct alignment. This idea was woven into a comprehensive, yet preliminary, master

plan which was presented to the community for their informal acceptance and later referred to the Highway Department and the Bureau of Public Roads.

Because of the great hue and cry from many small towns against by-passing, the Highway Department was glad to find mutual agreement with this community and accordingly recommended this location to the Bureau of Public Roads. Apparently the Bureau was still skeptical regarding this alignment because of the added travel distance. Since the Bureau had veto power regarding the location of these routes, the mayor bundled up his plans and soon appeared before the United States Senate Committee. The Mayor, following his trip to Washington, stated that his approach to the Senate Committee was in complete contradistinction to those who had spoken before him. It was quite obvious that all the arguments presented to the Senate Committee by other interested parties during their hearing revealed completely the divergent views of the various cities involved. On the other hand, the Senate Committee recognized that the Casa Grande plan was neither biased nor selfish, but was based upon fact, the reasonably predictable future, and due consideration for Highway planning standards. This case is an excellent example of the effect of a well-drawn and comprehensive plan for the development of the community in relation to an important interstate highway facility.

There are two sides to every coin. The reasons for these sometimes seemingly impetuous actions of highway departments probably result from the following:

1. Political pressures for diversified organizations within a community including governing bodies as well as interested property owners or groups.
2. The lack of a comprehensive plan in so many communities.
3. The shortage of qualified and professional city planners.
4. Misunderstanding or lack of knowledge of the services that the City Planner can provide.
5. Time element demands which force highway engineers to knowingly enter certain phases of the work without complete facts concerning city growth, trends, land use and other plans.

Any attempt to make recommendations regarding better correlation between the highway engineer and the city planner should well consider the above and other factors.

The highway program cannot be divorced completely from politics. Politicians are policy makers who should always be within easy reach of public opinion. They are as necessary to the formulation of the system as the highway engineer or city planner. Acting through public opinion, our senators and congressmen passed the 1956 Federal Highway Act, and they are certainly to be commended for a bold piece of far-sighted legislation. As a result of this legislation, our highway departments are charged with the responsibility of following through on this act and building highways for all of our people. Highway departments should not be answerable to any single group, but should consider the needs of all. The purpose of the interstate highway is to move people and goods by motor vehicle as safely and expeditiously as possible, connecting principal communities along the way. It is not to be designed as a freeway to connect, say Los Angeles with New York. By the same token, these highways should not split communities in half

nor bypass important communities at such a distance that it might be said that a highway once connected with the city but is now long gone.

Many communities lack a city plan of any sort. In these, it is of course difficult for the highway engineer to consider all of the factors involved in its orderly growth. Although the highway engineer should be acquainted with the fundamentals of city planning, full knowledge of the arts and sciences of city planning can not be expected. The highway engineer is, of course, the first to try to keep damages to a minimum in planning rights-of-way through existing development, but lacking a master plan, other damages not apparent on the surface can be equally as great. The highway engineer would rather skirt a neighborhood than slice it in half. But if the area is undeveloped, how can the future neighborhood, whether it be residential or industrial, be defined?

The highway engineer is confronted with a confusing variety of situations. There are cities that have had a master plan developed by fully capable professional city planners, but all to often, these plans were left in the hands of the novice who knew nothing about implementation and plan administration. Plenty of these packages are gathering dust on civic shelves. And there are some plans, of course, that had been prepared by incompetant and unqualified persons who professed to be city planners. In the light of these, it becomes very difficult for the average highway engineer to perceive, let alone convince local authority, that a given plan is wrong, and that other factors are due more weight in the location of the highway.

The engineering colleges throughout the nation, especially in the departments of civil engineering should institute courses in city planning. The least that should be taught would be a course that could be called "The Elements of City Planning." Other planning courses of a more technical nature should also be instituted. These would introduce the engineer to the problems of the city planner and would provide him with the ability to at least recognize the problem. If Arizona is any index of the current educational situation, it appears that the "socio-economist" seems to be running away with the show, while the civil engineer is content to let him do so.

It appears evident that state highway departments have regarded other special fields of engineering, tied to local community authority, as just another political squeak in the wheel. This type of attitude should be dispelled, and the problem should be tackled together, from the technical standpoint, as a mutual problem. It should not be felt that contacts between state and local level are completely of a public nature if they do not involve policy, except in the assistance of its formulation. Policy should be left to the politicians and engineering to the engineers, whether they be highway or planning engineers.

Better correlation between highway engineering and city planning, resulting in a better highway system, could be realized by adding a city planner to the Highway Department staff. The city planner should be the key man to cope with the preliminaries involved in the location of the highway and the geometric design of grade separations and traffic interchanges within urban areas. He should be a Civil Engineer who has had considerable experience in the field of city planning and recognized as a city planner by the American Institute of Planners. Lacking a state planning agency, he should be provided with a small staff of qualified juniors so that regional or community plans can be intelligently appraised or at least preliminary plans formulated if found necessary so that proper weight could be given certain highway locations and interchange designs.

There appears to be no legal significance to the title of city planner, so call him a planning engineer and get behind legislation requiring registration in the state in which he practices.

Another suggestion: require something of the localities. No community should really have the right to interfere with progress on our highways unless it has first qualified itself by due formulation and adoption of a master plan including, as a minimum, a general land use plan and a major thoroughfare plan and zoning solidly based on such plans. In other words, there should be requirements similar to a "workable program" as defined by the Urban Renewal Administration. There is no point in putting good money after bad.

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URBAN EXPRESSWAYS: WORK OF HIGHWAY AND PLANNING AGENCIES[a]

Fred W. Tuemmler,[1] A.M. ASCE

FOREWORD

In Proc. Paper 2048, Roger L. Creighton postulates that the movement of persons and vehicles on transportation systems and the activities of persons on land are both parts of human activity in cities. Consequently, planning for one means planning for the other. He then describes the procedure for joint planning of transportation and land use.

John S. Tsaguris, in Proc. Paper 2049, emphasizes the need for closer cooperation between highway engineers and city planners regarding general character, extent and location of highway facilities through or near urban areas.

In Proc. Paper 2050, Fred W. Tuemmler proposes that highway and planning agencies: 1. Establish formally joint policy of continuous collaboration, settle disagreements at staff levels - not in the local press; 2. Accelerate urban planning programs in fringe areas to meet highway planning deadlines; and 3. Invoke acquisition of development rights in interchange and approach road areas as supplemental land use controls.

A discussion of the subject of cooperative planning for urban expressways must begin with an understanding of the respective roles of the highway agency and the planning body.

Fundamentally, the highway department is an action agency. It is charged with the task of planning, designing, building, maintaining, operating and regulating a highway system. In its planning and building activities the highway agency is aware of time, and there exists the constant pressure to fulfill an assignment by a deadline date.

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a. Presented at the October 1958 ASCE Convention in New York, N.Y.

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By contrast, the planning body has as one of its chief functions that of acting as a coordinating agency. Basically, it is charged with the responsibility of preparing a general, comprehensive or master plan for the physical development of a community toward the objective that its future growth and development will be in an orderly, coordinated manner. Among the elements included in the comprehensive plan are those related to circulation (i.e., highways) and land use. Planners also have a regulatory responsibility with respect to land use - in the preparation of zoning ordinances and in subdivision administration.

In many jurisdictions, after the comprehensive plan is adopted, plans for physical improvements in the community, prepared by action or building agencies, must be referred to the Planning Commission before the building agency may proceed. Usually, however, this review responsibility is "advisory," the planning body lacking any real veto power over the building agency except through the force or weight of its argument and soundness of its reasoning.

Because of the nature of its task, the element of time does not weigh as heavily on the planning body as it does on an organization concerned with project planning and building. The programs and deadline dates of many groups may be involved, a study just beginning may have an important bearing on one in progress and in the mind of the planner delay in reaching a decision on one facet of community development may be less important than arriving at one in which all factors bearing on the problem are taken into account.

Planning bodies are charged by law with this responsibility of relationship. They must try to fit the complex elements of the community pattern of development into an efficient, orderly mosaic best suited to meet the diverse needs of the people and interests that make up the community.

The planner deals with an entity in which change or the prospect of change is an ever-present characteristic. Urban areas reflect, collectively, the efforts of individuals, groups and agencies, both public and private, bent upon their respective objectives, each calculated to produce some change in the community in which it operates.

Small wonder, then, that there is tension, difference of opinion and conflict. This is the world in which the planner finds himself. If he does not have the temperament to cope with tension or conflict, if he cannot submerge his own ego or have true humility in the interest of the great objectives of the plan in his role as coordinator, he will experience great difficulty in smoothing the troubled waters in the sea of turmoil around him.

But, on the other hand, it must be remembered that the planner cannot accomplish his assigned task alone. Coordinating means "arranging together" - cooperating means "working together."

At first glance it would seem possible easily to state the principles upon which cooperation must be founded, whether it be cooperative planning for urban expressways or the multitudinous activities and efforts of human enterprise in which the talents, efforts and opinions of people with different backgrounds, disciplines and - alas - prejudices are brought to bear on a subject.

Because it is essentially a problem in human relationship, one is inclined, initially, to approach it from the unscientific aspect of personal experience and observation.

This approach, however, must quickly be discarded. Although some planners and engineers from their own experiences may recall very happy and satisfying results that grew out of cooperative planning efforts between

planning and state highway engineering staffs, others may only remember endless controversy between city planners and highway engineers where interminable delay in reaching decisions required the intercession of the chief legislative body to settle the highway location battles. In the latter cases the engineers and planners involved undoubtedly were capable, intelligent professionals and reasonable human beings. What had happened in these instances that blocked the thinking of men of goodwill so that the important objectives seemed to be the defense of a position rather than a solution to a problem?

Limited inquiry indicates that the stalemates occur where one group or the other, or both, assumed an attitude of aloofness or an unwillingness of one to recognize the value that the other would have in the common task of serving the public.

The implications for extensive and far-reaching changes in our pattern of community development, particularly in the fringe portions of our metropolitan areas as a concomittant of the building of the Federal Interstate System, has resulted in a focus of attention on this business of highway planning and its relation to the total plan for the community. Much has been said and written about the impact of the highway program since the law was passed in 1956. Most of it points to the great need for clarifying anew the roles of the highway planner and the urban planner.

Read, for example, the October 1958 issue of Fortune Magazine in which Robert Lubar begins the second of his excellent articles entitled "A New Decade of Public Works" with this sentence, "The highway engineers have become the master planners of the future. . . ." and later "the new highways will be a major force in reshaping the metropolitan area. They will channel economic expansion, shift population, change living habits and the use of the land."

Or heed the warning prophecy of Professor John T. Howard, head of the City Planning Department at the Massachusetts Institute of Technology who said in his 1957 address to the National Planning Conference in San Francisco, "The highway engineers into whose hands this program has been delivered have assumed a terrible responsibility far beyond what many of them realize. They are, by and large, skilled and competent; perhaps more so in their field than we planners are in ours. But this program forces them to make decisions that have impact far outside their field."

And then listen to the clarion call to battle from the American Society of Landscape Architects expressed in a report published in the September 1958 issue of the Society's magazine where the Committee on Regional Parks and Playgrounds says 'Highway engineers - all over the country - uniformally seem to regard park lands as ideal locations for superhighways. Parks to them are waste and unused properties which they will "put to good use," without having to buy or disturb the owners of homes or other buildings, and which are available "for free." Those of us who believe that parks have a "positive" value should disabuse them of the idea that park lands are available without cost."

Next, hear the words of Glenn C. Richards, Commissioner of Public Works, Detroit as he admonished the urban planners in a 1957 speech at Little Rock. He said, "A word of caution is in order! It is realized that the perfect plan can finally be prepared if time is of no consequence. . . . talking must end at some point; plans must be completed and construction must start. . . ."

After reading the foregoing and many other similar conflicting comments, articles and speeches it appears that only through examination of "case

histories" in a number of states and in the metropolitan areas and cities within them may there be found common threads which, woven together, can provide a basic guide line to cooperative planning.

Answers to fifty questionnaires sent to twenty-five State Highway Directors or Chief Engineers and twenty-five Directors of Planning in the major cities or metropolitan areas in those states provide a basis for some tentative conclusions.

1. There is need in most jurisdictions for establishing a policy of coordination on a formal basis. Although most of the highway engineers and urban planners say that they "confer" it is done informally and "irregularly" or "as the need arises." One state that has a good record of coordination has the procedure spelled out in law. A number of others are pointing toward a formal continuing arrangement.

2. The coordinating process must be carried through each phase of planning from beginning to end. There is almost unanimous agreement between highway engineers and urban planners that the thoroughfare portion of the comprehensive plan should be done collaboratively. There is general agreement that preliminary studies for specific routes should be done together. There is substantial agreement that there should be continuing conferences or meetings so that each group knows at successive stages of development the thinking of the others. One highway department in an area that has seen its share of controversy suggests a unified staff with highway and urban planners working together on a day-by-day permanent basis. Another recommendation is for highway engineering staffs to employ urban planners and for city and metropolitan planning staffs to engage highway planners.

3. There is a need for an acceleration of urban planning programs, particularly in the fringe portions of metropolitan areas. Many highway engineers have voiced disappointment that these plans are not available or are in preparation, and one says "Some planners do not know the difference between time and eternity." This apparent inability in some areas to reach a decision on land use policy is one of the principal stumbling blocks to cooperative planning. A planner commenting on this says "It is not the engineers and planners who are at fault, it is public officials and citizens who throw roadblocks into our paths."

An obvious obstacle to getting things done in metropolitan areas is the lack in nearly every instance of the kind of governmental or planning structure such as now in effect in Toronto, Canada or recently developed for the Miami-Dade County, Florida metropolitan area to permit integrated planning and development of facilities which serve the area as a whole. This includes, in addition to highways, such items as water supply, sewerage, transit facilities, air pollution control, etc.

Political fragmentation in these areas often requires that the highway engineer confer with so many groups with conflicting interests that the highway agency is forced in the defense of its own program and, because of the risk of losing funds which have been committed, to taking an arbitrary stand which serves the needs of traffic alone, ignoring all else.

As an observation, this is an area where the Federal legislation might have taken the lead, as the catalytic agent to improve metropolitan area planning. There was a clear recognition by the Committee on Interregional Highways in 1944 that the greatest need for these facilities existed in and adjacent to the

major cities and metropolitan areas of the nation. Twelve years later the framers of the 1956 Highway Act had the example of the Housing Act of 1954 which recognized the need for acceptance of responsibility at the local level for the development of community plans as a foundation stone upon which plans for urban renewal and development might rest. But the highway legislation is strangely ambiguous on the matter, failing to provide the necessary directives for coordinating the interstate system with plans for the urban areas.

But to return to the planner's responsibility for making decisions, these plans must be moved ahead. Land use plans and zoning subdivision controls should be imposed as soon as possible in fringe areas before developers have committed the land in and adjacent to future interchange areas to uses which will nullify any later attempt at effective regulation. As a corrolary to this, there is need for more positive land use controls, not only in the interchange areas but along the roads leading to them. The planner's greatest fears for the future concern these areas, for he realizes the power and pressure of the special-interest groups who seek to exploit the land. He often views the land use plan with misgivings, realizing that it is a weak sister - a "shady lady" of planning, so to speak - seemingly always willing and ready to be violated by any plunderer who comes along.

4. The protection of interchange areas and access roads also must be of great concern for the highway engineer for it follows as night does the day that the intensification of marginal uses along these roads reduces their efficiency as traffic-carrying arteries and hastens the day of functional obsolescence and in turn the effectiveness of the expressway. Acquisition of development rights has been suggested as a solution to this problem. This requires the exercise of excess condemnation rights and will add costs initially to the project, but it may be one of the avenues of escape from suburban chaos that should be explored further.

The matter of highway costs referred to above calls to attention the need to recognize as valid the claim that park lands should not be regarded as free lands. Most of the respondents to the questionnaires expressed the view that parkland or other public lands should be used for highway purposes only when absolutely essential. There is general acceptance, too, that the replacement costs of a needed facility should be added to the cost of a highway; that, actually, it is the total cost that matters to the community.

5. Regarding the settlement of disputes between engineers and planners, there is complete agreement that these should be worked out at staff level. Where the practice has been established of conferring in the beginning of a project this has been successful. A cross check on responses from planners and engineers in several states reveals difficulty in settling differences of opinion when a route is committed and rubber-stamp approval from the planning body is sought. From that point on the case is tried in the newspapers. There is a sharp cleavage between planners and engineers on stalemated problems. Highway engineers believe that the final decision in such cases should be left to them because they are charged with the responsibility of building an efficient, economical facility. The planners, on the other hand, are willing to leave decisions in dispute to the chief legislative body.

In many of the responses from both highway engineers and urban planners one viewpoint stands out. There is strong evidence that each is willing to concede that the professional skills of the other is essential to a sound and lasting solution.

This leads to a conclusion that in the final analysis the formula for co-operative planning for urban expressways may be stated with the dignity and directness found in St. Paul's exhortation to unity in his Epistle to the Ephesians when he wrote "I, therefore, . . . beseech you that ye walk worthy of the vocation wherewith ye are called; with all lowliness and meekness, with long suffering, forbearing one another in love."

Journal of the
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PROFESSIONAL REGISTRATION OF CITY PLANNERS: GROWTH OF CITY PLANNING

Frederick P. Clark[1]

FOREWORD

Four authors discuss this subject from several different professional viewpoints.

Frederick P. Clark in Proc. Paper 2051, calls attention to the rapid growth of city planning and, as a consequence, the need to ensure that assignments are done by qualified professional planners. State registration is urged to give such protection to the public.

In Proc. Paper 2052, Paul H. Robbins states that state registration laws are justified only when need is shown for protection of the public health, safety, and welfare of the citizens of the state. While the work of city planners involves these things, it must also be shown that the failure to regulate will endanger public welfare.

W. H. Larkin suggests to city planners in Proc. Paper 2053 that in order to be recognized as a separate professional group, they must base their claims upon a foundation of adequate education as well as professional experience. The initiative in registration must come from city planners themselves.

In Proc. Paper 2054, E. Lawrence Chandler recognizes the apparent advantages of acquiring legal registration of professional planners to protect public interest. In view of some of the difficulties inherent in effectuating and administering a professional registration program, however, he suggests a possible alternate procedure.

Note: Discussion open until November 1, 1959. Separate discussions should be submitted for the individual papers in this symposium. To extend the closing date one month, a written request must be filed with the Executive Secretary, ASCE. Paper 2051 is part of the copyrighted Journal of the City Planning Division, Proceedings of the American Society of Civil Engineers, Vol. 85, No. CP 1, June, 1959.

1. Chmn. Committee on Professional Status, American Inst. of Planners, Cambridge, Mass.

ABSTRACT

This paper calls attention to the rapid growth of city planning and the need to insure that work is done by qualified professional planners. State registration is urged to give this protection to the public. The paper also points out that city planning firms are practicing in their own field and are not undertaking engineering work.

The nation is entering a period of increasing concern with the improvement of its cities and towns and with the guidance of new growth so as to avoid many of the problems that now face it in rebuilding urban areas that are obsolete and run down. In order that city planning may measure up to this need and opportunity, there must be an adequate supply of planners with requisite professional ability and experience. It will be necessary to insure that positions of planning responsibility are not filled with persons who are unqualified by training or who lack adequate experience. Our discussion today relates to the part the professional registration may play in identifying qualified city planners and thereby protecting the public interest.

In the words of the Constitution of the American Institute of Planners, city planning is defined as "the planning of the unified development of urban communities and their environs. . . , as expressed through determination of the comprehensive arrangement of land uses and land occupancy and the regulation thereof." The key words are "planning of the unified development" and "determination of the comprehensive arrangement of land uses." (Underlining supplied). In other words, the city planner's job is to look at and plan for the urban community as a whole, dealing primarily with the relationships of the various elements of the community – residential areas, business centers, industrial districts, schools and parks, and the highway and transportation network to serve these land uses. In so doing, the planner must anticipate and make allowance for future growth requirements, not just those of the present. He must plan for the proper integration of current projects into a well-organized future development.

It is possible to have beautifully designed schools, but in the wrong place or of the wrong size for the population they are to serve. It is possible to have well-designed sanitary sewer systems made obsolete long before their time because there was no plan to maintain the density of land use in relation to the sewer design. It is possible to have well-engineered industrial buildings without street systems adequate to handle the traffic from them.

It is the job of the professional planner to provide the overall plan that will make it possible for the engineer and architect to design the schools, sewer systems and industrial buildings so that they will have maximum utility and lasting value as a part of the city's structure. It is also part of the planner's job to devise the means of effectuating the city plan through zoning and other regulations and procedures.

City planning is a separate and distinct profession. The practice of city planning throughout our country today is being conducted by professionals who devote themselves entirely to this field, with the exception of a few private consultants who combine their practice with one in another profession. City planning is recognized as a profession by more than twenty of our leading institutions of higher learning in all parts of the country, all of whom have

formal courses of study leading to degrees in city planning. The American Institute of Planners, founded as the professional society of city planners in 1917, is well-organized and maintains high standards of professional qualifications and ethics. The membership has grown substantially, tripling in the last ten years alone.

The American Institute of Planners has been studying the matter of professional registration for several years and has an adopted policy of approving registration of the title of "professional planner" or other appropriate title, to insure that any person who calls himself a professional planner is qualified to be one.

If the persons making the plans for the future development of our cities are not qualified, the growth of our cities may be seriously affected. Very important decisions that affect the value of land as well as the way in which our citizens live are being made every day on the plans and recommendations of the city planners. The public has a right to expect that such persons be fully qualified, just as it expects that the persons who design the buildings, structures, sewer and drainage systems and other facilities be fully qualified. Insofar as I have been able to determine, professional registration is the only practicable means of identifying qualified professional persons, and of protecting the public, the profession and the qualified person against the charlatan, the unscrupulous, and those just not yet qualified for responsible tasks.

There are some who maintain that membership in a professional society should be sufficient to provide that identification. Engineering organizations long ago reached a conclusion that professional society membership alone is insufficient to accomplish the purpose. While they may maintain the highest of qualifications, they cannot prevent some person not qualified for membership in their organizations from calling himself an engineer and attempting to practice. Their organizational efforts must be supplemented by the action of the public through professional registration.

As an example of the problem caused by the fact that there is no professional registration of city planners, let us consider the present program of Federal Aid to local planning. These programs are administered in the various States by officials or agencies who have been assigned the job. They are responsible for entering into contracts for the provision of professional planning services to communities under 25,000 population in their respective states. Since they are responsible for the quality of work done under these contracts, most of them have found it necessary to establish their own standards and qualifications for professional planners with whom they will contract. In some states these standards are published; in many states they are not. In effect, they are operating a kind of registration system. One of the difficulties is their lack of authority to enforce their qualifications. Another difficulty is the fact that under this method some person, who may or may not be the best qualified to do so, establishes his own standards for determining whether a person is qualified to do planning in the State.

The American Institute of Planners has heard arguments from a few of its members that experience with the registration of engineers has not worked out too well and the city planners should avoid such pitfalls. One of these arguments is that registration has tended to discourage young professionals from entering the field in order to protect the jobs of those already in the field. Another argument is that registration has tended to "freeze" the professional mold and that there is a tendency to get "look-alike" engineers. Still another argument is that registration has tended to emphasize professional protection first and public protection second.

From what the writer has been able to determine to date, there is no substance to such arguments. Since they are presented to the city planners as reasons why there should not be professional registration of city planners, they would benefit from further information on experience with professional registration of engineers.

A recent survey of city planners in private consulting practice shows that the overwhelming majority are convinced that professional registration of planners is either desirable or necessary. Of these, the number of older practitioners who originally were registered as engineers or architects are equally convinced that registration of professional planners is desirable and needed.

The question is sometimes asked as to whether there is overlap or conflict in the fields of city planning and engineering. In this connection, it should be pointed out that none of the professional fields can have a sharp, clear boundary. It is not possible to put each of them into neat "watertight" compartments. There is and always will be a degree of overlap between the engineer and architect, the planner and engineer, and the architect and landscape architect. The writer well remembers a college classmate who found and put to work an overlap of the fields of medicine and mechanical engineering. He held degrees in each and was licensed to practice in each.

The American Institute of Planners' recent survey of the types of work done by private planning firms showed that planners are doing work which is strictly in their field. There were a few instances where a particular firm happened to have a combination of professional practices. A study of one specific area where there could be a potential conflict — that of preparing detailed subdivision plans and plats for record filing — showed that only 12 percent of the 108 planning firms reached in the survey prepare detailed subdivision plans for developers, and only 6 percent prepare plats for filing, and a further check showed that in these few firms the work is done by registered professional engineers, either on their own staff or in associated engineering firms.

The Committee on Professional Status in the American Institute of Planners has recommended that its Governors arrange meetings with the officers of the engineering societies to work out and agree upon joint statements that would clarify the respective fields of the city planners and the engineers, where there is any possibility of conflict.

Our cities are the product of many hands and many minds. We all have a part to play and, for the good of our cities and our country, we should exert a strong effort to work together and to make each other's work most effective.

Journal of the
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PROFESSIONAL REGISTRATION OF CITY PLANNERS: STATE REGISTRATION LAWS

Paul H. Robbins[1]

FOREWORD

Four authors discuss this subject from several different professional viewpoints.

Frederick P. Clark, in Proc. Paper 2051, calls attention to the rapid growth of city planning and, as a consequence, the need to ensure that assignments are done by qualified professional planners. State registration is urged to give such protection to the public.

In Proc. Paper 2052, Paul H. Robbins states that state registration laws are justified only when need is shown for protection of the public health, safety, and welfare of the citizens of the state. While the work of city planners involves these things, it must also be shown that the failure to regulate will endanger public welfare.

W. H. Larkin suggests to city planners in Proc. Paper 2053, that in order to be recognized as a separate professional group, they must base their claims upon a foundation of adequate education as well as professional experience. The initiative in registration must come from city planners themselves.

In Proc. Paper 2054, E. Lawrence Chandler recognizes the apparent advantages of acquiring legal registration of professional planners to protect public interest. In view of some of the difficulties inherent in effectuating and administering a professional registration program, however, he suggests a possible alternate procedure.

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ABSTRACT

State registration laws are justified only when need is shown for protection of the public health, safety and welfare of the citizens of that state. While the work of City Planners involves these things, it must also be shown that failure to regulate will endanger public welfare. Certainly a need is recognized for greater coordination and planning of all elements of a community. To justify registration, City Planners have to identify the work done, establish the qualifications to do this work and show danger to the public from practice by those not so qualified.

Approaching the question as to whether or not it is desirable to establish laws covering the practice of City Planning, one must look first at the justification for such laws. It will be recalled than when the several states ratified the Constitution of the United States they reserved unto themselves the right to protect their citizenry. The courts have held many times that the question of establishing by law certain qualifications for the practice of either a profession or a trade falls within this police power of the state. The pattern is thus well established that each state has the right to determine both the qualifications and the provisions under which such qualifications can be enforced via appropriate state laws. In all cases, however, these laws establish as their justification the protection of the public health, safety and welfare of the citizens of that state.

From the standpoint of the City Planner, does his work have direct bearing on these aspects of the citizenry of the state? It does not take much argument to show that a good plan of development for a community or other political subdivision has a strong bearing on the public health of those affected by that plan. The one facet alone of adequate water supply, sewage transmission, and public utilities, in general, supports this thesis. Safety too is involved if one considers the necessity for adequate and speedy fire protection, transportation and medical facilities. The welfare of the citizenry can perhaps be exemplified by poor planning where such items as educational and medical facilities poorly placed may seriously endanger the welfare of the people involved.

The next problem faced in endeavoring to write such legislation is, of course, who is involved and what do they do. Here the role of the City Planner is much more difficult to define. Not only does his work involve elements of the more traditional professions, but the things with which he may be concerned and for which he may be responsible cover a vast range of community life. They range from quasi or actual political considerations through the spectrum of economic, legal, engineering, and sociological problems.

While it may be possible to develop adequate definitions, both for the City Planner and the work of city planning, the problem of enforcement of these definitions and who can and cannot perform these functions would present many problems. As already noted, the City Planner is concerned with elements of other professions. Question may legitimately be raised as to whether or not a person may do a portion of the work involved in planning without being registered, whereas a person with broader responsibility but perhaps less knowledge of specifics might have to meet the legal requirements. What, for example, is to be the role of the engineer, the architect,

the lawyer, the public official, even the sociologist and the economist with respect to any law so enacted?

While it undoubtedly would be well established as to the ultimate objective of such registration; namely, to assure those who have need of adequate planning services of the competency of those whom they might engage, another well-established concept in such legislation is that it cannot be retroactive to deny an individual who has been involved in this work the right of continuing to perform these services. This is commonly referred to as the Grandfather Clause. Thus, it is probable that in the first registrations many who have performed only partial services in the area of city planning would have to be blanketed in as qualified for the total job. Whether or not, then, the end results would be an improvement in the situation or a more confused problem should be carefully considered.

Such legislation normally provides (if to be considered a profession) a period of formal education. This again would be somewhat difficult of evaluation. While there are a number of schools who have either city planning subjects or complete courses, particularly at the graduate level, these vary considerably. It might well be necessary for the board established to review the qualifications of applicants to also review the standards of education at the institution from which the individual received his education. In engineering, for example, the speaker is not aware of any accrediting procedure for undergraduate courses in city planning, nor is there even in engineering any accrediting program for graduate courses. The courses now available are under supervision by the departments of engineering and architecture, business administration and perhaps others. Since city planning covers so many of the more established disciplines, both of education and profession, is it desirable to try and establish those with moderate qualifications in each area as a new identifiable profession? Should not perhaps the first step be better laws concerning zoning and planning with greater authority for enforcement meeting broad, general principles of good community development rather than the question of qualifying the individuals concerned? Is it possible for city planners to act independently of a very difficult problem of political expediency and public pressure where ultimate decisions will be made by elected or appointed officials. Should these officials not check the advice of the several more specialized disciplines on which they ultimately must make their over-all decision?

The citizenry of any community as a whole would be quick to agree that there is need for greater coordination and planning of all of the elements going into the development of complex communities. The question City Planners must face is whether or not this coordination would be facilitated by the development of requirements for those who are called in to advise the legally-responsible officials on the decisions which not only affect the immediate development of the area but its long-range growth and power.

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PROFESSIONAL REGISTRATION OF CITY PLANNERS: FOUNDATIONS FOR REGISTRATION

William H. Larkin[1]

FOREWORD

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1. Pres. National Council of State Bds. of Eng. Examiners, Columbia, S. C.

ABSTRACT

City planners, to be recognized as a separate professional group, must base their claim upon a foundation of adequate education as well as professional experience. The initiative in registration must come from the city planners themselves. There is no doubt that they will play a most important part in future urban development.

Rapid urban and suburban growth has fostered the development of specialists in the art of city planning, as well as in traffic flow and landscape designing. Local real estate men, architects, engineers, any of those professions or trades normally involved in urban expansion, all consider themselves city planners to a greater or lesser degree. Should it be deemed necessary in the public interest to identify qualified city planners as a separate and distinct group, standards must be established and procedures set up properly to identify qualified persons in this area.

Should professional status be an ultimate goal of city planners, registration, curricula at the college level, and a technical society are all in the long range picture. Take the matter of registration, this procedure is primarily for the protection of the public from the incompetent. The engineer, so registered, is responsible for the application of special skills on an intellectual plane, based on fundamentals mastered, usually, in a four-year accredited engineering curriculum. Such a course, following high school, covers advanced mathematics, college physics and chemistry, basic engineering sciences, applied engineering courses, as well as selected subjects in the humanities. City planners, to be recognizable on a separate professional group must base their claim for consideration on a foundation of adequate education as well as experience in their particular area. Furthermore, the desire for such recognition must come from the group itself; the attainment of full legal and professional status will not be easy.

When the engineering law was first passed in New York, it was necessary to avoid depriving many persons of their livelyhood, those who were not strictly engineers but were working in the broad engineering area. Thus, the initial licensing law included what is known as the "Grandfather Clause." Thus, should city planners succeed in obtaining a registration law, it would be necessary to admit to practice under the terms of the act most persons claiming to earn their livelihood in that general area, be they contractors, gardeners, engineers, or architects. Thus, for the group to develop, and attain characteristics that will identify it as City Planners, will take a decade of serious and dedicated effort.

One of the questions most certain to be asked is whether city planners could qualify for registration under one of the present licensing laws, as, for instance, engineering. For the group as a whole, the answer must be an unqualified "No." Should an individual in this group be a qualified engineer, he could no doubt be licensed as a professional engineer. However, such registration would not in any way help to identify him as a City Planner.

There can be no doubt that City Planners, when properly qualified by education and experience will play a most important part in our future complex urban development. It should be in the public interest to require the registration of such persons. The initiative should come from those now working in the area; starting now, they have a decade of hard work ahead of them.

Journal of the
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PROFESSIONAL REGISTRATION OF CITY PLANNERS: ADVANTAGES OF REGISTRATION

E. Lawrence Chandler,[1] M. ASCE

FOREWORD

Four authors discuss this subject from several different professional viewpoints.

Frederick P. Clark, in Proc. Paper 2051, calls attention to the rapid growth of city planning and, as a consequence, the need to ensure that assignments are done by qualified professional planners. State registration is urged to give such protection to the public.

In Proc. Paper 2052, Paul H. Robbins states that state registration laws are justified only when need is shown for protection of the public health, safety, and welfare of the citizens of the state. While the work of city planners involves these things, it must also be shown that the failure to regulate will endanger public welfare.

W. H. Larkin suggests to city planners, in Proc. Paper 2053, that in order to be recognized as a separate professional group, they must base their claims upon a foundation of adequate education as well as professional experience. The initiative in registration must come from city planners themselves.

In Proc. Paper 2054, E. Lawrence Chandler recognizes the apparent advantages of acquiring legal registration of professional planners to protect public interest. In view of some of the difficulties inherent in effectuating and administering a professional registration program, however, he suggests a possible alternate procedure.

Note: Discussion open until November 1, 1959. Separate discussions should be submitted for the individual papers in this symposium. To extend the closing date one month, a written request must be filed with the Executive Secretary, ASCE. Paper 2054 is part of the copyrighted Journal of the City Planning Division, Proceedings of the American Society of Civil Engineers, Vol. 85, No. CP 1, June, 1959.

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ABSTRACT

Recognizing the seeming advantages of requiring legal registration of professional planners as a measure for protecting the public interest, some of the difficulties inherent in such a program are discussed and a possible alternative procedure is suggested.

For this discussion of professional registration as it may apply to city planners some reference to registration of engineers may be worth while. Perhaps there may be some points that will be useful to those who are considering the feasibility of requiring registration of planners.

Many questions come to mind. When and where did registration become a reality? Did the program meet with enthusiastic support from the public and from engineers themselves? How long did it take to gain country-wide registration? Etc., etc. Time will not permit detailed discussion but a few facts will be cited.

It was 51 years ago, in 1907, that Wyoming adopted the first state law requiring registration of engineers. The urge behind that action was prompted by slip-shod work on the part of self-styled engineers who were responsible for distribution of precious water for irrigation. Inevitably, the result of legal registration was better service to the public and enhancement of the prestige of the profession of engineering in Wyoming.

A year later, Louisiana enacted a law but the third one did not appear until 1915. Including our states and territories and the District of Columbia, there are 53 registration laws in effect as of 1958. It took 22 years to pass the half-way mark and 27 more to complete the list. The Canal Zone became number 53, in 1956. Thus, half a century was required to reach the present status.

It hasn't been easy. One would just about believe that the public wasn't concerned about measures to protect it from incompetent practice of engineering. And, indeed, it has appeared at times that engineers, themselves, weren't much concerned about statutory recognition of engineering as a profession. It took a lot of doing on the part of forward-looking, dedicated men to bring about enactment of 53 registration laws.

One of the major efforts through the years has been the production of a Model Law to serve as a guide in formulating the various state laws. The first step in that direction was taken by ASCE when, in 1911, it published a draft of an "Act to Provide for the Licensing of Civil Engineers." In 1915, six national engineering societies collaborated in preparing a new and more comprehensive draft. As the years passed, more and more societies joined in the program with a fine spirit of cooperation and the Model Law underwent numerous revisions until the current version came into being in 1946 as the result of cooperation on the part of 13 organizations.

Well, after 51 years of hard-gained progress, what do we think of the result? It is far from perfect. However, who can say what perfection in registration would be? Let's not permit that to bother us too much. With all the imperfections it is hard to believe that any engineer would deny that the result has been soundly constructive.

As for the public welfare - of course, registration does not provide an infallible guarantee against occasional faulty engineering, but it does provide a

very large measure of protection with respect to the practice of a profession whose impact on civilization is profound.

As for the individual engineer, and the profession as a whole, registration has served a useful purpose. A man's capabilities are not increased by the mere formality of registration, but his standing in the eyes of the layman and in the courts of law is enhanced as a result. The profession has gained in prestige through statutory recognition.

Perhaps it may be wondered why it has been thought appropriate to dwell on these historical aspects of legal registration for engineers. It is just to emphasize the thought that if professional planners find the path to registration rough and the progress slow, such circumstances, in themselves, should not be sufficient reason for abandoning the cause.

Getting closer to the subject of to-day's discussion, one may ask whether city planning is an activity such that a requirement of legal registration may be appropriate. A look at the "Model Law for the Registration of Professional Engineers" may be helpful in trying to make an appraisal. In the first section it is found that the law is designed " to safeguard life, health, and property, and to promote the public welfare. . . " That clause, or one of similar import, states the need for registration in our state laws. It is the only basis on which registration properly can be founded. In reverse, it well may be considered that any whose services bear on the objectives stated ought to be required to register as an indication of competence in their areas of activity.

Surely, lives, health, property, and the public welfare all are affected by environmental conditions. Surely, all are better safeguarded in a well-planned community with sound government than in one that just grows and eventually outgrows it facilities, without regard to adequate planning. If that thinking is accepted as being correct, it seems to follow quite logically that those who are responsible for planning ought to be properly qualified for the purpose and that the public is entitled to have some assurance that they are properly qualified, either by legal registration or some other satisfactory means.

Thus far, one can be quite comfortable in thinking about the need for registration. Beyond this point, however, certain confusions arise. Consider some questions to which satisfactory answers do not seem to be evident.

One essential feature of a registration act is an adequate description of the functions to be regulated by registration. This is basic. Obviously, regulations to govern registration cannot be properly prepared or enforced unless there is a clear description of services for which the registration is demanded. In the past, there have been instances where acts to govern registration of professional engineers have been ruled to be inoperable because they carried an inadequate definition of the term "engineering" or "practice of engineering."

Therefore, it is of major importance that a satisfactory definition of "planning" be established if a law is to be effective. Preparation of such a definition is a difficult task.

"An Act to regulate practice by professional planners, . . ." was introduced in the Assembly of the New Jersey State Legislature this year. No doubt, a lot of careful thought went into the preparation of that Act and we will do well to pay attention to it. Let us examine the wording a bit. It carries a definition of "Professional Planning" which, although rather long, is worth quoting. It reads as follows:

" 'Professional Planning' means the administration, advising, consultation or performance of professional work in the development of master plans and urban renewal plans; technical bases for zoning ordinances, subdivision ordinances and official maps; and other programs or regulations intended primarily to guide governmental policy for the assurance of the orderly and co-ordinated development of municipal, county, regional, and metropolitan areas, and the State or portions thereof, with the objective of promoting their physical, economical, social and general welfare. It includes the collection, analysis, evaluation and presentation of facts, trends and proposals, and the development of integrated plans for both future growth and renewal, by means of statistical analysis, reports, graphs, diagrams, maps, charts and other means of graphical representation. It also includes the consideration of population and income trends, public finance, intergovernmental relationships, existing and future land use patterns, and needs, public and community facilities, capital improvements programs, circulation and transportation, conservation of resources and open spaces and such other matters which are relevant to the appropriate development and administration of the aforementioned. The work of the professional planner shall not include or supersede any of the duties, responsibilities or prerogatives of licensed professional engineers, land surveyors or registered architects of the State of New Jersey."

That is a pretty formidable definition. It calls for knowledge and ability of a variety of sorts and indicates the need for competence in engineering, architecture, finance, law, statistics, social science, economics, government policy, etc.

Is it contemplated that a person, in order to be registered as a "Professional Planner" must be an expert in all of these phases of planning? He would be something of a paragon. Or, would it be appropriate to designate a registrant as "Professional Planner (Engineer)," "Professional Planner (Economist)," etc.? The latter might provide a way out of the dilemma, but would the result be satisfactory?

Again, the last sentence of the definition states that "The work of the professional planner shall not include or supersede any of the duties, responsibilities or prerogatives of licensed professional engineers, land surveyors or registered architects. . ." Engineers, surveyors, and architects play significant parts in any substantial planning program. Surely, a "Professional Planner" hardly could qualify under the definition without possessing abilities in the fields they represent, yet the planner could not "include or supersede any of the duties" covered by them. To be sure, if the registered planner were also registered as a professional engineer, surveyor and architect he would be in good order, but it would be asking a lot to require such status.

In another section of the New Jersey Act, it is provided that a registered architect or a licensed professional engineer who has had at least three years of acceptable professional planning experience, would be eligible for registration as a planner. Suppose such a person never has had occasion to become expert in other fields included in the definition and yet is well qualified to contribute his abilities to his own important aspects of planning. Are we to understand that, unless he becomes registered as a planner he cannot perform any of the engineering or architectural work that is so essential to planning? Maybe, it is contemplated that the "Professional Planner" will just hire engineers and architects, as occasion may arise, and that he will

assume responsibility for their contributions to planning if they are not registered as "Planners."

In any event, the situation is a confusing one.

Now, after having presented, thus far, what must seem like a somewhat dim view of prospects for legal registration, a suggestion will be offered that may contain a germ of constructive thought.

Reference is made to the American Sanitary Engineering Intersociety Board.

The field of sanitary engineering has become widely ramified during the past two or three decades. It encompasses very much more than development of water supplies and disposal of sewage, which two phases of the field rather commonly seem to be considered to constitute the entire scope. Competence in areas other than traditional engineering is involved. In respect to complexity it bears some resemblance to planning. Those engaged in its practice came to feel that the tremendously important part played by sanitary engineering in advancing and maintaining our high standard of living was poorly understood. Those working in public health organizations found that their status as professional engineers did not receive recognition comparable to that afforded to members of other professions. It was concluded that it would be greatly in the interest of the public and of sanitary engineers to establish a means of giving positive recognition to their vitally important speciality and to provide a roster of those who are competent in the field.

At one time, it was proposed that a new national society be formed but that idea was abandoned after thorough study and appreciation of the many complications involved. After long consideration of possible methods of accomplishing the desired end, the American Sanitary Engineering Intersociety Board was incorporated under the laws of Delaware, in 1955, as a nonprofit organization. It is the function of the Board to grant certification to properly qualified applicants, who, upon certification become members of the American Academy of Sanitary Engineers. The procedure is quite similar to that followed by the various specialty boards in the field of medicine.

The official members of the corporation, 18 in number, constitute a Board of Trustees. Three of these members are drawn from each of the following organizations - American Society of Civil Engineers, American Public Health Association, American Water Works Association, Federation of Sewage and Industrial Wastes Associations, and American Society for Engineering Education. The other three members are chosen at large.

A Sanitary Engineering Specialty Committee carries highly important responsibilities. It has the responsibility of formulating and recommending to the Board of Trustees standards of competence to be met by applicants for certification. This committee also conducts examinations and recommends to the Board certification of those deemed to be qualified.

As the result of fees for application and examination and with an annual charge for renewal of certificates, the organization is self-supporting.

Note that this entire operation is without any statutory regulation. It is a voluntary development within the profession which provides a means of signalizing the competence of specialists in the field of sanitary engineering, according to the judgment of a group of their peers. The program has met with general enthusiasm and, as of October, 1958, after less than three years of life, there have been about 900 certifications of people who eagerly have sought the distinction conferred. The number, of course, will increase as

the result of periodic examinations of applicants. The desires of the proponents have been realized and the Board is serving a useful purpose.

A good description of the certification program, including copies of the Certificate of Incorporation of the Board and of its Bylaws is carried in the February, 1956, Newsletter of the ASCE Sanitary Division.

This development has been cited with the thought that something of the sort might serve the needs of professional planners. No attempt is made to judge whether it would be as satisfactory, or more so, than legislatively administered registration. If, however, the latter proves to be unattainable on a satisfactory basis, a program similar to that of the Intersociety Board might provide an answer to the problems of professional planners in this respect.

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FREEWAYS IN URBAN PLANNING[a]

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SYNOPSIS

The history and development of Freeways as elements in urban and metropolitan plans will be reviewed in this paper. It will show how a concept originating in 1930 has now spread to encompass state and federal plans. The impact of these highways, without any direct access from abutting property, to the various elements of urban planning as embodied in master plans, urban renewal programs, and municipal zoning, will be described. Coordinated transportation plans and the prevention of continuous strips of urban development through zoning are suggested as urgent problems for the immediate future.

INTRODUCTION

The term "Freeway" was first coined by Edward M. Bassett, Attorney, who then headed the Legal Division of the Regional Plan of New York and Its Environs. This term first appeared in an article by Mr. Bassett in The American City, February, 1930, entitled "The Freeway - A New Kind of Thorofare" and the definition he gave was as follows:

"A freeway is a strip of public land, dedicated to movement, over which the abutting owners have no right of light, air or access."

He described the need of such a facility as follows:

"We are more and more feeling the need of a new kind of thoroughfare—one which will be like a highway for both pleasure and business vehicles,

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but which will be like a parkway in preventing the cluttering-up of its edges. We have no name for such a thoroughfare. No law in this country provides for such a novel trafficway. I suggest the name freeway. A freeway denotes freedom from grade intersections and from private entrance ways, stores and factories. It will have no sidewalks and will be free from pedestrians. In general, it will allow a free flow of vehicular traffic. It can be adapted to the intensive parts of great cities for the uninterrupted passage of vast numbers of vehicles."

You will note that Mr. Bassett thought of the Freeway as a solution for urban traffic and did not foresee its extension to inter-regional and trans-state routes. During the past ten years how rapidly this conception has taken root and spread, even to trans-continental routes.

At the time of the Freeway's conception the total automobile registration in the United States was 26,532,000. The normal running speed on major highways was about 25 miles per hour and 40 miles per hour was considered a top speed. Many of our state highways had lanes nine feet in width but the newer ones were being built with what was then thought to be a generous width of ten feet. In urban centers traffic congestion was a matter of great public concern, as it still is; this is one phase of the problem that has not changed very much. The then modern system of traffic control was a system of stop-and-go lights which was just starting to replace either hand control by a traffic policeman or a free-for-all contest where no policeman was available.

In presenting his definitions, Mr. Bassett pointed out the difference between a "parkway" and a "freeway," the former being a strip of land devoted to recreation as against movement in the case of the Freeway.

The legal provision for Freeways required state enabling legislation. This took time and has developed different terminologies, but in each case they have embodied Mr. Bassett's concept.

The first Freeway Bill was introduced in California in 1933 but action was slow and did not come until 1939. New York came first with the adoption of a Limited Access Highway Act on April 19, 1937, followed a few days later by the Rhode Island Freeways Act approved April 27, 1937. During the next five years Connecticut, California (as mentioned above), West Virginia, Colorado, Maryland, Michigan, and Ohio followed suit. Under the Congressional action of 1956 all states will obtain Freeways.

Early Studies for Expressway Systems

The Regional Plan of New York and Its Environs included in its 1929 Comprehensive Plan a proposed system of express highways for the metropolitan area.(1) While its report pointed out the advantage of uninterrupted movement on such routes, it expected that there would be some compromise in such a program as it referred to "an approximately uninterrupted traffic flow."

The first comprehensive presentation of the modern Freeway and its application to urban areas was in one of the Information Bulletins published by the Regional Plan Association, the successor to the Committee which sponsored the Regional Plan of New York and Its Environs.(2) This proposed a comprehensive system of Freeways in the metropolitan area to provide, for all types of traffic, the type of express movement that the modern parkways, then under construction in Westchester County, New York, provided for passenger vehicles only. For precedent, it referred to the national system of

Reichautobahnen which had been begun in Germany in 1933, following the Autostrada built a few years earlier in Italy by private corporations as toll roads.

The Regional Plan Bulletin presented plans and cross-sections for the typical treatment of Freeways under varying conditions. The ultimate capacity of such routes was shown as six lanes, carried on two 37-foot roadways with a median strip 26 feet in width. Grade separations to permit completely uninterrupted movement was proposed, with interchanges only at important highways. A minimum right-of-way width under normal circumstances was shown as 160 feet with control of at least 35 additional feet on each side of the right-of-way through "state zoning, purchase of easement, contractual agreements with abutting owners or special border control legislation." Through bottle-necks in urban centers a minimum right-of-way of 90 feet was suggested by reducing the median strip to 8 feet and substituting retaining walls for side slopes. At this date, over 22 years later, these standards are still fairly sound.

As an application of these new principles to the Graphic Regional Plan of 1929, this Bulletin included an expanded system of Freeways for general traffic and Parkways for passenger traffic to serve the entire regional area. Nine of the radial routes were proposed to extend beyond the area and become inter-regional highways.(3)

During the succeeding years, the Freeway concept has spread rapidly throughout the country and has been discussed fully in many papers before the American Society of Civil Engineers. Prominent among the authors of such papers are representatives of the U.S. Bureau of Public Roads, including Thomas H. MacDonald and Joseph Barnett.

The most extensive development of parkways without direct access has occurred in the New York metropolitan area, with the Bronx River Parkway in Westchester County the pioneer route. This was, and still is, not completely express as a few traffic lights are found at minor intersections. The newer parkways are completely express routes, except for an occasional grade crossing with a minor roadway in rural areas. The latest of these parkways in the New York-New Jersey metropolitan area is the Garden State Parkway in New Jersey which now runs the full length of the state.

Metropolitan systems of Freeways have been developed most intensively in Los Angeles County, California, and in the New York-New Jersey-Connecticut metropolitan area but are being rapidly developed in other metropolitan centers, such as Chicago, Philadelphia, Boston, and the District of Columbia, to mention only a few.

During the last ten years the states have gone in for state-wide systems of interurban Freeways, spearheaded by the Pennsylvania Turnpike and now providing continuous routes free of traffic lights from New York to Chicago and from Maine to Washington along the eastern seaboard. The purpose of these state routes was primarily to connect main urban centers within their respective states. They are designated as turnpikes, Freeways, or thruways.

With the initiation of the federal-aid interstate highway system in 1956, it is expected that by 1970 motor vehicles will be able to cross the country in almost any direction by a continuous system of Freeways with the convenient connecting routes into all major urban centers. This is being undertaken as a crash program under the direction of a newly created Office of Federal Highway Administrator in the U.S. Bureau of Public Roads. The procedure worked out to guarantee a sound plan generally includes the following nine steps:

1. Inclusion of the route by the U. S. Bureau of Roads, with a general description, as a part of the interstate system authorized by Congress under the federal-aid highway act of 1956.

2. Preparation of a preliminary study by a private engineering firm, under contract with the state highway department and working in close collaboration with that department.

3. Public hearings by the state highway department, with representatives of the Bureau of Public Roads present, at which alternative routes are presented and discussed on the basis of analyses made by the state's consultants.

4. Recommendation by the state highway department of a specific location to the Bureau of Public Roads.

5. Reaching of an agreement between the state highway department and the municipalities along the route.

6. Publication by the state highway department of the report of its consultants showing preliminary designs and estimates of the right-of-way costs and construction costs for the route recommended.

7. Approval by the Bureau of Public Roads.

8. Preparation of contract designs and specifications, by sections, of the route, each section allotted to a different engineering firm so as to make the best use of available engineering manpower.

9. Advertising for bids, leading to letting of contracts and actual construction.

Impact of Freeways on Urban Planning

While the preceeding introduction has digressed to some extent from the subject of urban planning, the balance of this paper will be directed more specifically to that phase of the problem.

To use a medical analogy, where Freeways have been built within cities which have been suffering, in common with other cities, from a bad case of traffic congestion, the Freeways have improved the circulation of the patient. Strangulation of its main arteries has been replaced by freer flow of traffic on the new routes but serious congestion within its principal organs (such as downtown shopping, wholesale, and office centers) still remains. In general, the life of the patient seems to have been saved, but he still needs corrective treatment if he is going to survive.

The principal phases of urban planning on which Freeways have had the greatest impact are: (1) an increase in the scope of planning; (2) the land use plan; (3) the thoroughfare plan; (4) local traffic problems; (5) the recreation plan; (6) urban renewal; and (7) zoning. Each of these will be discussed briefly, with particular attention to the effect upon them of the federal-aid interstate highway system now under construction.

Increased Scope of Planning

City planning commissions, in studying their highway problems, as well as in other phases of planning, must give consideration to regional planning. This

is particularly true in metropolitan areas where a balanced economy in the region must be established if each of its individual political units is to find its proper function in a regional development. This is particularly true in the planning of those elements of the federal interstate system which pass through metropolitan areas.

The procedure described above for the federal interstate system does not specifically provide for bringing into the picture the city planner or official planning commission in the area traversed by the route. Nevertheless, there is general agreement that the expressway should not unduly disrupt any existing city or regional plans and should give consideration to planning principles.

Under procedures established by the urban renewal agency for its approval of urban projects calling for clearance and rebuilding of blighted areas, reference to and approval by the local city planning commission is made a prerequisite of federal approval for any loan and grant contracts. Could such a requirement have been written into the 1956 highway act?

Because of the lack of any active planning agencies throughout much of the area traversed by the routes and the fact that, where there are active agencies, they generally are not well-enough financed to undertake promptly the necessary studies, the writer believes that such a requirement would have resulted in delays that would have seriously upset the program.

Existing city plans can be effectively brought to bear upon the problem only if there is effective cooperation between the local planning agencies and the state highway departments that handle the design contracts. This is not likely to happen unless the planning commissions take the initiative and unless they are broad-minded enough to examine the problem from a regional as well as a local point of view. The attitude of "Put the highway somewhere else as long as you don't come through our community" is no solution to the problem and leaves the state in a difficult position, particularly where adjoining communities take this same attitude.

In designing a system of urban expressways, it should be remembered that they work in two directions: they encourage the decentralization of certain types of industries and certain types of residence; and, by making it easier to reach urban centers, they stabilize and encourage downtown business, entertainment centers, wholesale uses, expanded port development, and homes for the many people who prefer urban living.

Land Use Plan

Any Freeway, with its wide right-of-way and the difficulty and cost of continuing local streets across it without grade crossings, is bound to create a barrier between adjacent portions of the city. This effect can be minimized by careful design and is least noticeable when the Freeways are depressed. Their location and design should be worked out in close relationship with the city's Master Plan. If this is done, the separation of the city into segments may be a means of stabilizing the Plan rather than a process of disrupting it.

Any urban area will group itself into a pattern of residential neighborhoods; where urban Land Use Plans have been adopted, the boundaries of these neighborhoods are usually incorporated in such a Plan. It is highly desirable that any Freeway crossing a municipality should not cut across these neighborhoods but should, where possible, follow along their boundaries. In some cases, these boundaries will follow railroad rights-of-way, watercourses, bridges, or other features, natural or man-made, which dictate their locations.

In other cases, boundaries may follow the line of demarcation between an apartment district and a one-family district or between a residential district and an industrial district.

Sometimes topography may dictate the location of the Freeway and some adjustment in neighborhood boundaries, by revision of the Land Use Plan, may prove to be desirable.

Thoroughfare Plan

A system of Freeways will establish the principal elements of the Street Thoroughfare Plan for any metropolitan area. It is obvious that the entire system of main highways — including major routes of a non-expressway type, secondary thoroughfares and important connecting routes, together with any parkway system that may be existing or proposed -- should form a coordinated regional plan for highway movement. The importance of fitting the federal interstate system of expressways into municipal thoroughfare plans has been clearly brought out in those metropolitan areas where these routes are now being laid out. In a few cases, thoroughfare plans adopted as parts of Master Plans have indicated the logical location for such routes. Often local plans have not foreseen and provided for the type of expressway contemplated in the interstate system. In many communities no thoroughfare plans or land use plans have been officially adopted. Where existing planning commissions did not take the initiative in presenting proposed routes to the state highway departments, or there were no such commissions, the state departments and their consultants have had to go ahead without the benefit of any comprehensive planning for the areas with which they were dealing.

Planning moves slowly in most communities and agreements on and adoption of Master Plans is often delayed through inadequate financing and local controversies. In spite of these handicaps, I believe the state highway departments and the Bureau of Public Roads are making a serious effort to see that the interstate expressways are located in conformance with sound planning principles.

Local Traffic Problems

Whether the interstate expressways completely bypass the smaller municipalities or go through the edges of the larger ones they will create local traffic problems in each. These involve highway connections with the urban centers and the parking problems created by traffic using such connections.

Freeway interchanges with existing street systems, in each case without any left-turns on the expressways and generally without such turns on local streets, will occur at a limited number of points. Selection of these points will determine the downtown approach routes which, in many cases, may not be able to handle resulting traffic without widenings or other improvements.

As the expressways will carry both trucks and passenger vehicles, interchanges in residential areas create local problems of diverting truck traffic entering or leaving the expressways to routes where it will not adversely affect residential neighborhoods.

In some cases there will be obvious approach routes to which connections can be made, but this may prove to be the exception rather than the rule. In any event, where a city already has adopted a street thoroughfare plan, some adjustments to it are sure to be required. A progressive city planning commission must study these adjustments while the highway planning is still in

its preliminary stages if a satisfactory solution is to be worked out.

Frequently it may prove desirable to have an interchange connected with a pair of streets, each of which can be operated for one-way traffic, to avoid overloading a single street. Here again co-operation between the city and the designer of the expressway, through the state highway department, can prove helpful.

Wherever Freeways may be located, there will be need for improved arterial routes to connect them with the downtown areas. This will result in a concentration of parking requirements where these routes enter the downtown area. Adjustments in any earlier plan for offstreet parking facilities are sure to be needed as the interstate expressways take shape and their interchanges with local street systems are determined. Where the resulting concentration of traffic entering downtown is great enough, it may prove desirable to substitute multi-level garages for parking lots either existing or proposed.

Recreation Plan

There have been examples where studies for the interstate expressways have come into serious conflict with the park and recreation systems of munitipalities.

Generally, consulting firms retained by the state highway departments have made their preliminary locations for the interstate routes on air maps of the area. These maps show clearly where the built-up areas are and what areas are still free from development. They do not show the use of these open areas.

Some preliminary locations have taken the most direct routes with little regard to their effect upon the local community. In other cases, they appear to have utilized any open spaces that appeared on the maps without any detailed study as to their present use or that for which they are most suitable.

In the former case, local municipalities have objected strenuously to the cutting up of their community and have requested locations either along their boundaries or in adjoining municipalities. In the latter case, it has sometimes developed that the proposed locations have cut directly across parks and playgrounds, threatening irreparable damage to the recreation system of the municipality.

In such situations the local park commissions have registered strong objections. It has been pointed out that parks as well as improvements have great value and are often less replaceable.

An example of this occurred in Wilmington, Delaware, in the preliminary planning for an interstate route which is proposed to pass through the residential areas in the western portion of that city. The route first recommended by the State Highway Department was objected to by the President of the Board of Park Commissioners on the grounds that it would destroy 51 acres of the city's 311 acres of park land and would run for 2.1 miles through park property. He claimed that the highway planners had selected their location because the highway could be built more cheaply on park property. After the preliminary series of hearings the State Highway Department recommended, and the city and the Bureau of Public Roads approved, a different alignment a few blocks nearer downtown which not only avoided the elimination of the small parks and playgrounds along the earlier route but included in the design the provision of some park and recreation facilities along the borders of the proposed new highway. It was still necessary to

cross Brandywine Park, the city's main public park, but this is proposed to be done by a viaduct designed to insure minimum injury to that park.

Through the co-operation of park commissions and city planning commissions it should be possible, through comprehensive planning, to expand recreation facilities of a municipality in conjunction with the construction of Freeways, using such recreation facilities as partial buffers between the expressway and adjoining residential areas.

Urban Renewal

The coordination of Freeway location with the clearance and rehabilitation of blighted areas as part of a city's urban renewal program can be very advantageous.

Where the private reuse of a slum clearance project can be combined with a section of the interstate system, the municipality will have a direct saving in its contribution to the net loss between the costs of clearance and redevelopment. Under the United States Housing Act the municipality must pay one-third of this loss; the balance being assumed by the federal government. If a joint condemnation procedure can acquire part of a blighted area as a right-of-way for a federal interstate route, the municipality will not have to pay anything for that portion of the area as the federal government assumes 90% of the cost of the freeway and the state contributes the remaining 10%.

The present urban renewal programs are much broader than slum clearance and rebuilding; they also envisage stabilizing and rehabilitating areas that are uneconomic and show serious signs of becoming blighted unless remedial action is taken through code enforcement, supplemented by some partial clearance. The major objective of these general programs is to improve the economy of the city by increasing values through promoting new and stable improvements.

Freeways, with their wide rights-of-way, necessarily require substantial demolition of existing structures where they pass through built-up urban areas. Many municipalities, when discussing such routes, hear claims from property owners that taxes will be increased, not only through the loss of taxable structures but also through depreciation of values of developed property bordering such highways. There is, however, substantial evidence to show that the construction of Freeways, particularly where they are depressed beneath existing streets and the rights-of-way are wide enough to establish landscaped borders, has had little deleterious effect on abutting improvements and has often increased land values.

Municipalities should make a fair appraisal of potential increases in value of land abutting proposed Freeways, which increases may much more than compensate for the loss in taxable values as a result of the property acquired for a public use.

Zoning

While the Land Use Plan discussed above should be effective in guiding the general pattern of land use of the community, the only binding and legal control of such use is through the process of zoning. As the establishment of Freeways inevitably raises some questions as to their effect on the use of adjoining property, they naturally bring about discussions of changes in the zoning map. As almost all our urban areas are zoned today, the invasion of urban residential districts along Freeways by the spotty development of

business and commercial development has generally been guarded against. This is not the case in large stretches of the interstate expressway system where it passes through suburban or rural areas which are without zoning protection. Prompt zoning of such areas is essential if these areas are going to grow in accordance with a plan, but that problem is outside the scope of this paper.

As a Freeway is without any direct access from abutting property, its borders cannot become cluttered with roadside industries or commercial uses which have ruined the traffic usefulness of many main highways in suburban areas. There will, however, be pressures to rezone for commercial uses areas around the interchanges between Freeways and major arterial streets. This should be done only after careful study has demonstrated the need for additional business sites in that portion of the city. Indiscriminate rezoning of such areas is bound to increase the turning movement of traffic in the vicinity of these interchanges and created serious bottle-necks on the arterial routes.

The writer is convinced that while urban Freeways may create some new industrial or business sites within the areas they traverse, residential use can be stabilized along much of their borders and the general zoning pattern of the municipality need not be seriously upset.

In any event, the zoning map should be restudied to make sure that any needed adjustments are taken care of. In some cases new apartment districts may be justified, particularly in those neighborhoods lying between a Freeway and the downtown area.

Conclusions and a Look Ahead

Its highway system has always supplied the framework and skeleton which a city has been built. A system of Freeways in an urban area does much more than this; it has a definite impact upon many other elements of a city's Master Plan as well as on the plans of its suburbs. In metropolitan areas its influence extends throughout the complex structure of such areas.

The mileage of Freeways within the United States will be tremendously increased upon the completion, within about a decade, of the 41,000 miles of the federal-aid interstate expressway system. Through the example they will provide, more Freeways will be built by state agencies, probably financed through the collection of tolls.

If Freeways are to become a useful and integral part of urban areas, it is essential that the highway engineers and the city planners cooperate closely, starting with the preliminary planning of such routes. This is particularly urgent in the development of the federal-aid interstate expressways. City planning commissions must broaden their horizons and review such plans from a regional, and not just a local, point-of-view. Where municipalities have already adopted Master Plans, whether they be for highways, land use, recreation facilities, urban renewal, or in the form of zoning maps, they should take a fresh look at them in relation to any Freeway proposals.

The complexity of the impact of Freeways emphasizes the need of laying them out as part of coordinated transit and transportation plans for handling both passengers and freight. There is danger that people may conclude that all our transportation problems will be solved by new highways, but the writer is convinced that the only sound solution is one that retains mass

transit as a part of the picture. Otherwise, our urban areas are likely to become choked with vehicles which can find no place to stop or park.

Railroads throughout our country are in serious trouble, much of which they blame on their losses in carrying commuter traffic. Recent statements in the New York press have prophesied that within another decade railroad commuter traffic into New York City will be abandoned. To the writer this seems to be fatalistic thinking and its effect would border on the disastrous. It comes from looking at only part of the problem and emphasizes the need of broader thinking, in the case of New York City on a tri-state basis. Instead of planning only highway rights-of-way, we should think more of "communications corridors," a term used in the New York Regional Plan, as a means of providing "for all major types of land communication facilities."(4)

The late Daniel L. Turner was working towards such a solution in his report as Consulting Engineer to the Detroit Rapid Transit Commission submitted on April 10, 1924. He recommended a system of 204-foot superhighways, plans for which were later adopted in the Detroit Master Plan. These were designed to combine four tracks of rapid transit with both local and express highways. The plan has been only partly carried out.

In a recent article in Harper's magazine, John I. Snyder, Jr., an industrial executive, makes a strong plea for retaining railroads in the transportation picture.(5) He states that

> "Our national transportation system is in one hell of a mess. That is a flat statement of fact, and it is true whether you look up at our great airliners in the sky, or down at our more prosaic vehicles on the ground. It is true of every pathway we travel, and something has to be done about it soon."

He describes the advantages of railroads in the transportation picture as follows:

> "Even today they can carry traffic between many of our cities, during peak hours, faster than most of us can drive the same runs in our private cars. The explanation is that the railroads already possess the physical characteristics of any sensible rapid ground-transport system—the rights of way directly connecting our metropolitan centers. Their terminals are far better located than any airport can be. Moreover, excellent studies have shown that a railroad right of way can accommodate twenty times more people than an express highway lane, and that it costs only one-fifth as much to transport people by rail as by road."

He claims we must have a new kind of railroad, a problem he believes research can solve as follows:

> "All we need is a vehicle that can carry us faster along the ground, from the center of Boston to the center of Washington, say, than a 500 mph aircraft can carry us—and this can be done by a safe land carriage moving at only 100 mph!"

Some people have suggested that the future city should assume the form of multi-level strips built along and around expressways, with offices, dwellings, and all services combined in the same structures. Thus vertical transportation could be substituted for much of the horizontal movement along a city's streets. The writer does not consider this a happy solution and much prefers the Garden City concept of Ebenezer Howard.

Don't let our inter-regional expressways become strip cities but let them do what their name implies — connect regions and, within those regions, connect urban centers, and let there be plenty of greenbelts between such centers!

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3. See discussion by the writer of "The Modern Express Highway" by Charles M. Noble, Transactions, American Society of Civil Engineers, Vol. 102 (1937) page 1123.

4. Regional Plan, Volume 1, "Graphic Regional Plan," 1929, page 222.

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JOURNAL

CITY PLANNING DIVISION

Proceedings of the American Society of Civil Engineers

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CITY PLANNING EDUCATION FOR THE CIVIL ENGINEER[a]

Discussions by John H. Matthews and John Alexander Logan

JOHN H. MATTHEWS,[1] M. ASCE.—This report is most welcome and very timely in view of the national trend in engineering education to prepare all of our civil engineering graduates for research and development. The writer heartily agrees with Professor Whistler that we should continue to design our civil engineering education for civil engineers.

The School of Civil Engineering at Purdue University has, for many years, included in its curricula as senior technical electives one course in City Planning and one in Municipal Engineering. These are two (2) credit hour courses meeting two hours per week at the present time. Beginning with the September 1959 term, both courses will be increased to three (3) credit hours each.

The current curriculum provides an opportunity for civil engineering students interested in city planning to receive training for this type work as may be seen from the following program at Purdue University.

Transportation Engineering I	(Required)
Transportation Engineering II	(Required)
City Planning	(Technical Elective)
Municipal Engineering	(Technical Elective)
Principles of Traffic Engineering	(Technical Elective)
Traffic Engineering: Operations	(Technical Elective)

Other schools and departments of the University offer courses in Sociology, Economics, Political Science and Speech. These are available as elective courses for the civil engineering students. Opportunity for fifteen (15) credit hours of these non-technical electives is provided in the curriculum.

Civil Engineering courses in City Planning and Municipal Engineering are described as follows for the semester beginning in September 1959:

C.E. 506—City Planning. Class, 3 Hrs. per week, Credit 3. The scope and methods of city planning, history of planning, planning legislation, development of planning administration, streets and street patterns, traffic and transportation, land use and zoning, public utilities, housing, parks and playgrounds, public buildings, city appearance.
A research project is assigned each student.
Prerequisite: Senior standing.
Textbook: "Local Planning Administration," International City Managers Association.
Professor Matthews.

a. Proc. Paper 1877, December, 1958, by Committee on Education of the City Planning Division.

1. Associate Prof. of Civ. Eng., Purdue Univ., Lafayette, Ind.

C.E. 528—Municipal Engineering. Class, 3 Hrs. per week, Credit 3. City government, engineering and legal problems of the city engineer, city surveys, city planning, zoning and subdivision designs, legal procedures for making and financing public improvements, city maps, public utilities, building codes. A design project is assigned each student plus a research project.
Prerequisite: Senior standing.
Textbook: "Municipal Affairs" by Ernest W. Steele, International Textbook Company, Publishers.
Professor Matthews.

The role of the civil engineer as a city planner outlined in Section III of the paper under discussion is very well covered and furnishes ample proof of the need for the inclusion of courses in city planning in civil engineering curricula. A careful analysis of a State Planning Statute covering the preparation of a "Master Plan" indicates the need for the services of civil engineers in planning. Since the development and redevelopment of our cities is the fundamental responsibility of civil engineers, an opportunity for training in city planning should be included in the civil engineering curricula for students who wish to enter the field of city planning.

The writer agrees with the committee report that students should be encouraged to enroll in curricula leading to a degree in city or regional planning. He further recommends that more publicity be given to the importance of city planning education, and every effort be made to obtain recognition of this by the ECPD and also the ASEE. Once this has been accomplished, it should be easier to obtain legislative recognition.

JOHN ALEXANDER LOGAN,[1] M. ASCE.—City planning instruction, besides its value in training engineers as planners, has an important role in providing a unifying philosophy or framework for all civil engineering education. This unity is now lacking. The background of civil engineering education and the important role of planning is examined from this point of view.

The Problem

Civil engineering is facing a crisis. Traditionally the oldest and strongest division of the engineering profession, it is not now attracting either the number or the quality of young engineers needed to maintain its status. This is not due to any marked decrease in the demand for civil engineers. On the contrary there has never been a time in history when the need has been so great nor the opportunities so attractive. There are undoubtedly a number of civil engineers who are doing sub-professional work which could be done by technicians, but the demand for professional services has been increasing; the level of construction work in buildings and highways, for instance, is approaching an all-time high. While there is increasing appreciation of the importance of civil engineering to the welfare of the country, we have not succeeded in making the profession sufficiently attractive or challenging to attract its share of brains and ability.

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Background

Part of the present dilemma may be inherent in the character of the civil engineering profession. It is the oldest organized division of the profession and, in terms of numbers, the largest. It covers a wider range of activities than any of the other divisions, including structures, soil mechanics, sanitation, transportation, construction and hydraulics. These fields are not necessarily closely related and emphasize different fundamentals. For example, structures is based primarily on mathematics and solid mechanics but sanitary engineering places more emphasis on chemistry, physics, biology, epidemiology and fluid mechanics.

The civil engineer deals primarily with projects which have a "public" association; roads and bridges are classified as public works; sanitary engineering is an essential part of public health; canals, buildings, railroads and hydraulic works, whether publicly or privately financed, are normally subject to public control. Much of the work which civil engineers do has a direct impact on the public and affects their comfort, convenience or health. To plan work of this kind the civil engineer must be educated in economics and the social sciences as well as in his professional subjects; to construct and operate major projects, he must be able to organize and deal effectively with people.

While today's education stresses modern scientific developments, much of the work of the civil engineer deals with problems which have not changed since primitive man first learned to use tools: the control of floods, the building of roads and bridges, the development of water supplies and the construction of buildings. This type of work is essentially different in nature from that of the electrical, mechanical or chemical engineer. In dealing with the environment and its wide variety of conditions, civil engineering resembles mining and agricultural engineering.

The original scope of civil engineering, as defined by Thomas Tredgold in 1828 at the founding of the Institution of Civil Engineers in London, was stated as:

> the art of directing the great sources of power in Nature for the use and convenience of man; being that practical application of the most important principles of natural philosophy which has, in a considerable degree, realized the anticipations of Bacon, and changed the aspect and state of affairs of the whole world . . . Civil Engineering . . . is limited only by the progress of science; its scope and utility will be increased with every discovery in philosophy, and its resources with every invention in mechanical or chemical art. Since its bounds are unlimited, equally so much be the researches of its professors . . .

The profession, as it exists today, is not the result of a rational development of this original concept but, rather, includes only those activities remaining after large areas of responsibility have been taken over by other engineering groups. The first to break away in Great Britain were the mechanical, electrical and mining engineers, followed by an increasing number of specialties such as chemical, aeronautical, nuclear and industrial engineering. The same general pattern has been followed in the United States. Civil engineering now includes only the remnants of the original profession, a fact which explains, at least in part, its present diversity.

While many of the problems which civil engineers deal with have not changed over the centuries, scientific knowledge and technical know-how have been revolutionized. There has been a tendency in the profession, however, to conservatism of outlook and to the retention of the educational pattern which has served so well in the past. Based on the premise that civil engineers are essentially different than their professional colleagues, one argument has been that modern physics and advanced mathematics are not applicable to the civil engineering curriculum, and that emphasis should be placed on the ability to get things done efficiently and economically. Others, anxious to avoid the stigma of a scientifically second-rate profession, have been inclined to go along with the trend toward more science. In this latter case, however, since civil engineering is unique in its work, there is an important question as to what is meant by engineering fundamentals. Accepting the standards established by the electrical and mechanical groups may not be the answer. Perhaps we require a different fundamental approach: statistics rather than differential equations, engineering economics rather than atomic physics, operations research rather than advanced electrical engineering. One thing is certain, advantage should be taken of all new scientific tools that are available. The decision as to what these should be, however, can only be decided intelligently after we have agreed on objectives.

Environmental Control

In considering objectives, the lack of a cohesive civil engineering philosophy is evident. This lack of cohesion is due not only to the diversity of areas of specialization, such as soil mechanics and sanitary engineering, but also because of the tendency to further specialization in these fields rather than considering them from a broad point of view. Sanitary engineering, for example, deals primarily with public water supply and sewerage and is not usually concerned with the closely associated problems of water supply for industrial or agricultural purposes. As a result, important areas have been defaulted to other groups, often less competent by training and interest to deal with them. Similarly, soil mechanics has been concerned with the physical properties of soil to the exclusion of chemistry, biology and geology, and it is only recently that serious consideration has been given to geotechnology, an attempt to incorporate more of the basic sciences in the study of soil mechanics. A geotechnical approach would lead to a better understanding of the soil and to a wider application in the fields of agriculture as well as in engineering.

While there are undoubtedly several possible concepts of civil engineering which might serve as unifying philosophies to provide a more rational approach to its future development, few of these have the merit of "environmental control". Based on the original objectives of the profession as defined by Tredgold, it is evident that most of the work of the civil engineer is concerned with the modification, adaptation and control of man's physical environment. The history of civil engineering is, in fact, a history of man's ability to control and utilize water, soil, climate, plants and animals for his own well-being. All too often this broad goal has been forgotten; the trees of specialization have become more important than the forest of overall objectives. As a result, we are now faced with situations in our cities where we have highly effective services such as public water supply systems, streets and sewers, but these do not necessarily add up to a satisfactory environment in which to live.

Professor A. J. S. Pippard, President of the Institution of Civil Engineers, has made this distinction between engineers and technicians: technicians know "how" to do work of an engineering nature but engineers know not only "how" but also "why". The overall objective, according to Pippard, is important, and it is necessary for a profession to have this in order to have a better understanding of the place of its specialties. Environmental control provides such an overall objective.

Inherent in a consideration of environmental control is an understanding of physical planning, an understanding of the relationship between man and his environment. This infers not only the short range objectives of a particular highway, bridge or dam but also the effect of the structure on the community. It infers that good design is based not only on the criteria of structures, hydraulics and engineering economics but takes into account social, political and aesthetic considerations. Civil engineers have been criticized by planners and administrators for short sightedness. A limited or narrow point of view is at least partially true and stems from a limited view of what is meant by good design. From the planning point of view, good design means more than simply satisfying conventional engineering criteria.

An understanding of planning is essential to an understanding of the "why" of civil engineering. This has, however, been a much neglected area of engineering, and engineers as a whole have been critical of plans and of planners. Planning, as developed by schools of architecture and landscape architecture, has tended to be a highly individualized art based on idealized and ill-defined concepts rather than the rational application of generally accepted principles. This has resulted in a wide range of effectiveness; there are many examples of superb and inspired plans but all too often city plans have been incomplete and poorly conceived. This is a necessary stage in the process toward maturity and city planners themselves have been among the first to recognize their deficiencies. These in no way detract from the importance of the planning nor its primary objective of coordinating the efforts of engineers, realtors, architects and others in the development of cities which express the desires and needs of their citizens. Engineers have not been notably cooperative nor sympathetic to this point of view but recent developments in urbanization, notably the traffic problem, have forced them to re-evaluate the situation. The need for planning and coordination is obvious and the engineer, if he is not to be reduced to the role of a mere technician, must be cognizant of the responsibility which he has to the community as a whole as well as to his immediate client.

An appreciation of the civil engineer's role as the expert in controlling man's physical environment—an understanding of planning as it expresses the needs of man, particularly in an urban environment—can serve as the unifying philosophy needed to bring together the diverse specialties which make up the civil engineering field. This is not a new or revolutionary objective but is merely a restatement of the original concept of the profession as understood by its founders.

The Northwestern Workshop

In order to review the objectives of civil engineering in general and its own department in particular, a group of engineers, planners and other professional men were brought to the Northwestern campus early in 1958 for a two-day

workshop.* The Ackerman Report on Civil Engineering Education had just been issued and was available for review; staff papers had been prepared on the possible place of construction in the graduate curriculum and on the use of public works-environmental control as a broad guide for the development of the department.

Following a vigorous and wide-ranging review of civil engineering and civil engineering education, it was agreed that the challenges facing the profession were as exciting and as important as at any time in history. It was further agreed that although these were often unrecognized by the profession, they were in no way less challenging nor necessarily less glamorous than space travel, rockets, automation or the other newer fields which have been attracting so much attention to the mechanical, electrical and science engineering groups. Some of these major areas were defined as follows:

A. Water Resource Development. During the next half century the progress and activity in this field could rival the great railroad development of the last part of the nineteenth century.
B. Transportation. The importance of transportation in the national economy, and the need for a better understanding of the place and interrelationship of the various modes—rail, road, air, pipeline, water—stress transportation as an important but neglected field.
C. Urban Development. The civil engineer, more than any other professional, is concerned with the unprecedented growth in size and importance of metropolitan areas. The urban problems of transportation, water supply, drainage, construction, etc., are as challenging as any of our time.
D. Construction. This, the single largest industry in the United States, presents important problems in design, efficiency and management.
E. Overseas Development. Most of the newly developing countries of the world are faced with problems of transportation, water supply, drainage, housing and sanitation similar in nature to those successfully solved in the development of the United States. Civil engineers can play a leading role in providing technical leadership and know-how in helping raise world standards of living, in keeping with the objectives of the United States and the United Nations.

It was further agreed that these broad areas, while they need the highest degree of professional skill, also require a broad understanding of the interrelationships of engineering, politics, economics, and social objectives. It was believed that the depth necessary for the mastery of the engineering sciences and the breadth necessary to understand these interrelationships were not incompatible, but required a new approach at both the educational and professional levels. It was further agreed that the approach could be provided by the use of a combination of the environmental control and planning view-points, not simply by the establishment of a single new course or series of courses but by the adoption of this philosophy as a basic part of all civil engineering teaching at Northwestern.

*See WORKSHOP REPORT.

The Challenge

At a time when the imagination of the world has been stirred by the possibilities of man's conquest of outer space, civil engineers must dramatize the importance of a better control and utilization of the physical environment of the earth itself. World population is growing at a rate never before equalled or approached in world history; overcrowding, housing, transportation, sanitation and water-use are problems which are becoming more acute from year to year.

Because the civil engineering profession is now faced with the critical problem of its future development, serious consideration should be given to long-range objectives. Civil engineers must be prepared to adopt whatever new tools are available in mathematics and the physical sciences and, with the findings of the social scientists, develop engineers who are not only the professional equal of any of the other branches of engineering but who also have a special understanding and appreciation of their own role in society.

The Northwestern Approach

A beginning is being made to incorporate at least some of the recommendations of the workshop into the civil engineering program at Northwestern. Courses in planning for civil engineers are now being offered at both the graduate and undergraduate level. Through research and seminars a serious attempt is being made to reach a better understanding of the planning function and to have this reflected throughout the curriculum.

As to mathematics and science, in keeping with the rest of the Technological Institute, greater emphasis is being placed on a high level of attainment in these areas, as well as in the basic engineering sciences, fluid mechanics, solid mechanics, and thermodynamics.

The need for research in planning and construction is recognized as a prerequisite for advanced developments in these areas. The possibility of employing the new systems analysis techniques so successfully used by management and by military and industrial engineers is being investigated.

The role of the humanities is also being reviewed; the organization of this portion of the civil engineering program is probably the most inefficient of any of the general areas of study. This is not unique to Northwestern but is common throughout the country. Because of the wide range of subjects available there has been a "cafeteria" tendency to select courses on the basis of convenience in scheduling rather than to develop a logical pattern of education.

One of the advantages of being associated with a great university is the broad range of courses and staff available in the liberal arts area. It is believed that these could be used more effectively and more rationally than has heretofore been the case through the understanding of the culture inherent in engineering and its development and by a better appreciation of the role of the engineer in society. In many respects economics, political science, anthropology, sociology and psychology are tools in civil engineering and must be as effectively used as mathematics and physics. Courses are being designed to stress these relationships in the hope that the young civil engineer will develop his interests in the social sciences as a life-long avocation and that his reference books in anthropology and political science may have a place on his library shelf with those in structures and hydraulics.

SUMMARY

It is suggested that the civil engineering profession can be revitalized through a clear recognition of its special role in the future of the United States and the world. While there may be some difference of opinion as to the details of this role, general agreement should not be difficult. Based on this objective a philosophy of education can be adopted which would permit the different civil engineering specialties to work together to fulfill their role in the overall picture. It is believed that the environmental control approach integrated into a program of city and regional planning is a logical answer to this problem.

PROCEEDINGS PAPERS

The technical papers published in the past year are identified by number below. Technical-division sponsorship is indicated by an abbreviation at the end of each Paper Number, the symbols referring to: Air Transport (AT), City Planning (CP), Construction (CO), Engineering Mechanics (EM), Highway (HW), Hydraulics (HY), Irrigation and Drainage (IR), Pipeline (PL), Power (PO), Sanitary Engineering (SA), Soil Mechanics and Foundations (SM), Structural (ST), Surveying and Mapping (SU), and Waterways and Harbors (WW), divisions. Papers sponsored by the Department of Conditions of Practice are identified by the symbols (PP). For titles and order coupons, refer to the appropriate issue of "Civil Engineering." Beginning with Volume 82 (January 1956) papers were published in Journals of the various Technical Divisions. To locate papers in the Journals, the symbols after the paper number are followed by a numeral designating the issue of a particular Journal in which the paper appeared. For example, Paper 1859 is identified as 1859 (HY 7) which indicates that the paper is contained in the seventh issue of the Journal of the Hydraulics Division during 1958.

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JUNE: 1658(AT1), 1659(AT1), 1660(HY3), 1661(HY3), 1662(HY3), 1663(HY3), 1664(HY3), 1665(SA3), 1666 (PL2), 1667(PL2), 1668(PL2), 1669(AT1), 1670(PO3), 1671(PO3), 1672(PO3), 1673(PL2), 1674(PL2), 1675 (PO3), 1676(PO3), 1677(SA3), 1678(SA3), 1679(SA3), 1680(SA3), 1681(SA3), 1682(SA3), 1683(PO3), 1684 (HY3), 1685(SA3), 1686(SA3), 1687(PO3), 1688(SA3)[c], 1689(PO3)[c], 1690(HY3)[c], 1691(PL2)[c].

JULY: 1692(EM3), 1693(EM3), 1694(ST4), 1695(ST4), 1696(ST4), 1697(SU2), 1698(SU2), 1699(SU2), 1700(SU2), 1701(SA4), 1702(SA4), 1703(SA4), 1704(SA4), 1705(SA4), 1706(EM3), 1707(ST4), 1708(ST4), 1709(ST4), 1710 (ST4), 1711(ST4), 1712(ST4), 1713(SU2), 1714(SA4), 1715(SA4), 1716(SU2), 1717(SA4), 1718(EM3), 1719 (EM3), 1720(SU2), 1721(ST4)[c], 1722(ST4), 1723(ST4), 1724(EM3)[c].

AUGUST: 1725(HY4), 1726(HY4), 1727(SM3), 1728(SM3), 1729(SM3), 1730(SM3), 1731(SM3), 1732(SM3), 1733 (PO4), 1734(PO4), 1735(PO4), 1736(PO4), 1737(PO4), 1738(PO4), 1739(PO4), 1740(PO4), 1741(PO4), 1742 (PO4), 1743(PO4), 1744(PO4), 1745(PO4), 1746(PO4), 1747(PO4), 1748(PO4), 1749(PO4).

SEPTEMBER: 1750(IR3), 1751(IR3), 1752(IR3), 1753(IR3), 1754(IR3), 1755(ST5), 1756(ST5), 1757(ST5), 1758 (ST5), 1759(ST5), 1760(ST5), 1761(ST5), 1762(ST5), 1763(ST5), 1764(ST5), 1765(WW4), 1766(WW4), 1767 (WW4), 1768(WW4), 1769(WW4), 1770(WW4), 1771(WW4), 1772(WW4), 1773(WW4), 1774(IR3), 1775(IR3), 1776(SA5), 1777(SA5), 1778(SA5), 1779(SA5), 1780(SA5), 1781(WW4), 1782(SA5), 1783(SA5), 1784(IR3)[c], 1785(WW4)[c], 1786(SA5)[c], 1787(ST5)[c], 1788(IR3), 1789(WW4).

OCTOBER: 1790(EM4), 1791(EM4), 1792(EM4), 1793(EM4), 1794(EM4), 1795(HW3), 1796(HW3), 1797(HW3), 1798(HW3), 1799(HW3), 1800(HW3), 1801(HW3), 1802(HW3), 1803(HW3), 1804(HW3), 1805(HW3), 1806(HY5), 1807(HY5), 1808(HY5), 1809(HY5), 1810(HY5), 1811(HY5), 1812(SM4), 1813(SM4), 1814(ST6), 1815(ST6), 1816(ST6), 1817(ST6), 1818(ST6), 1819(ST6), 1820(ST6), 1821(ST6), 1822(EM4), 1823(PO5), 1824(SM4), 1825(SM4), 1826(SM4), 1827(ST6)[c], 1828(SM4)[c], 1829(HW3)[c], 1830(PO5)[c], 1831(EM4)[c], 1832(HY5)[c].

NOVEMBER: 1833(HY6), 1834(HY6), 1835(SA6), 1836(ST7), 1837(ST7), 1838(ST7), 1839(ST7), 1840(ST7), 1841(ST7), 1842(SU3), 1843(SU3), 1844(SU3), 1845(SU3), 1846(SU3), 1847(SA6), 1848(SA6), 1849(SA6), 1850 (SA6), 1851(SA6), 1852(SA6), 1853(SA6), 1854(ST7), 1855(SA6)[c], 1856(HY6)[c], 1857(ST7)[c], 1858(SU3)[c].

DECEMBER: 1859(HY7), 1860(IR4), 1861(IR4), 1862(IR4), 1863(SM5), 1864(SM5), 1865(ST8), 1866(ST8), 1867 (ST8), 1868(PP1), 1869(PP1), 1870(PP1), 1871(PP1), 1872(PP1), 1873(WW5), 1874(WW5), 1875(WW5), 1876 (WW5), 1877(CP2), 1878(ST8), 1879(ST8), 1880(HY7)[c], 1881(SM5)[c], 1882(ST8)[c], 1883(PP1)[c], 1884(WW5)[c], 1885(CP2)[c], 1886(PO6), 1887(PO6), 1888(PO6), 1889(PO6), 1890(HY7), 1891(PP1).

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FEBRUARY: 1933(HY2), 1934(HY2), 1935(HY2), 1936(SM1), 1937(SM1), 1938(ST2), 1939(ST2), 1940(ST2), 1941(ST2), 1942(ST2), 1943(ST2), 1944(ST2), 1945(HY2), 1946(PO1), 1947(PO1), 1948(PO1), 1949(PO1), 1950(HY2)[c], 1951(SM1)[c], 1952(ST2)[c], 1953(PO1)[c], 1954(CO1), 1955(CO1), 1956(CO), 1957(CO1), 1958(CO1), 1959(CO1).

MARCH: 1960(HY3), 1961(HY3), 1962(HY3), 1963(IR1), 1964(IR1), 1965(IR1), 1966(IR1), 1967(SA2), 1968(SA2), 1969(ST3), 1970(ST3), 1971(ST3), 1972(ST3), 1973(ST3), 1974(ST3), 1975(ST3), 1976(WW1), 1977(WW1), 1978(WW1), 1979(WW1), 1980(WW1), 1981(WW1), 1982(WW1), 1983(WW1), 1984(SA2), 1985(SA2)[c], 1986 (IR1)[c], 1987(WW1)[c], 1988(ST3)[c], 1989(HY3)[c].

APRIL: 1990(EM2), 1991(EM2), 1992(EM2), 1993(HW2), 1994(HY4), 1995(HY4), 1996(HY4), 1997(HY4), 1998 (SM2), 1999(SM2), 2000(SM2), 2001(SM2), 2002(ST4), 2003(ST4), 2004(ST4), 2005(ST4), 2006(PO2), 2007 (HW2)[c], 2008(EM2)[c], 2009(ST4)[c], 2010(SM2)[c], 2011(SM2)[c], 2012(HY4)[c], 2013(PO2)[c].

MAY: 2014(AT2), 2015(AT2), 2016(AT2), 2017(HY5), 2018(HY5), 2019(HY5), 2020(HY5), 2021(HY5), 2022(HY5), 2023(PL2), 2024(PL2), 2025(PL2), 2026(PP1), 2027(PP1), 2028(PP1), 2029(PP1), 2030(SA3), 2031(SA3), 2032(SA3), 2033(SA3), 2034(ST5), 2035(ST5), 2036(ST5), 2037(ST5), 2038(PL2), 2039(PL2), 2040(AT2)[c], 2041(PL2)[c], 2042(PP1)[c], 2043(ST5)[c], 2044(SA3)[c], 2045(HY5)[c], 2046(PP1), 2047(PP1).

JUNE: 2048(CP1), 2049(CP1), 2050(CP1), 2051(CP1), 2052(CP1), 2053(CP1), 2054(CP1), 2055(CP1), 2056 (HY6), 2057(HY6), 2058(HY6), 2059(IR2), 2060(IR2), 2061(PO3), 2062(SM3), 2063(SM3), 2064(SM3), 2065 (ST6), 2066(WW2), 2067(WW2), 2068(WW2), 2069(WW2), 2070(WW2), 2071(WW2), 2072(CP1)[c], 2073(IR2)[c], 2074(PO3)[c], 2075(ST6)[c], 2076(HY6)[c], 2077(SM3)[c], 2078(WW2)[c].

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c. Discussion of several papers, grouped by divisions.

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